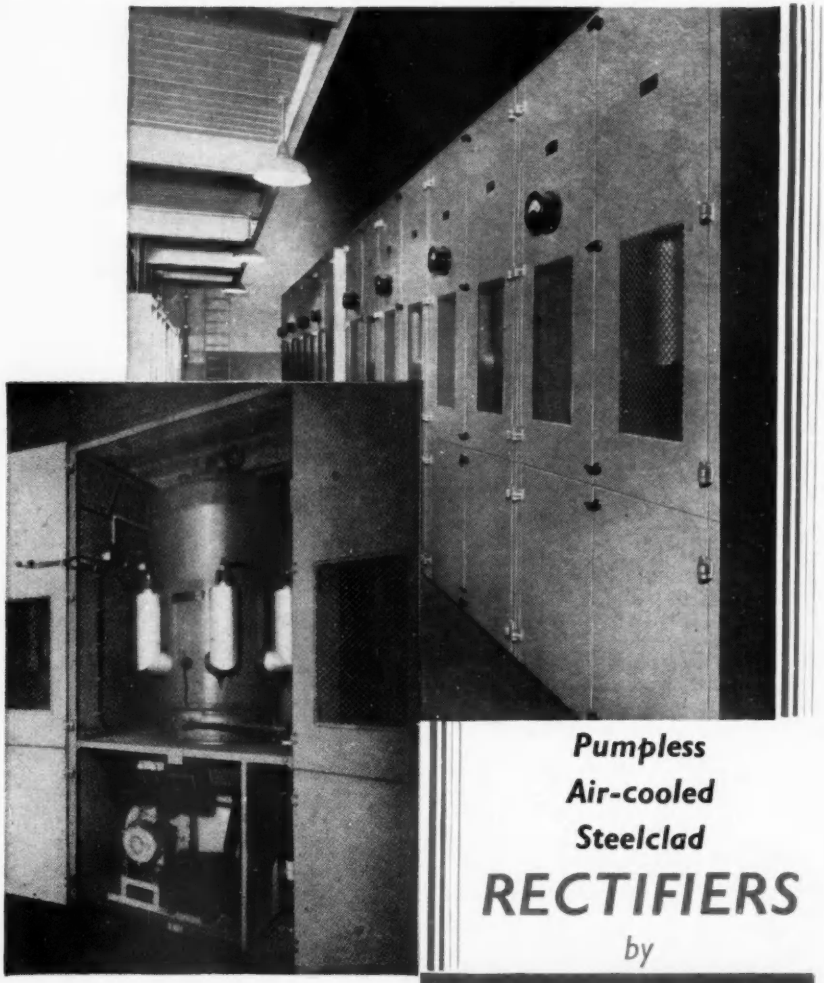
ELECTRICAL TIMES

THURSDAY
13 MAR.
1952
NINEPENCE



Pumpless
Air-cooled
Steelclad
RECTIFIERS
by
G.E.C.

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Creda
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FROM STOCK

The 'C.80' looks so modern and attractive and holds so much! Look for these points: Complies fully with BSS 1326 : 1949 — Rust-proofed steel body, finished in corrosion-resistant cream enamel (mottled grey to order) with black stoved enamel plinth—Hinged aluminium lid—Ten gallons of water will boil quickly in the copper tub—Elements are arranged in two unequal circuits controlled by D.P. switches (for D.C. supplies S.P. switches can be fitted at no extra cost)—Competitive price

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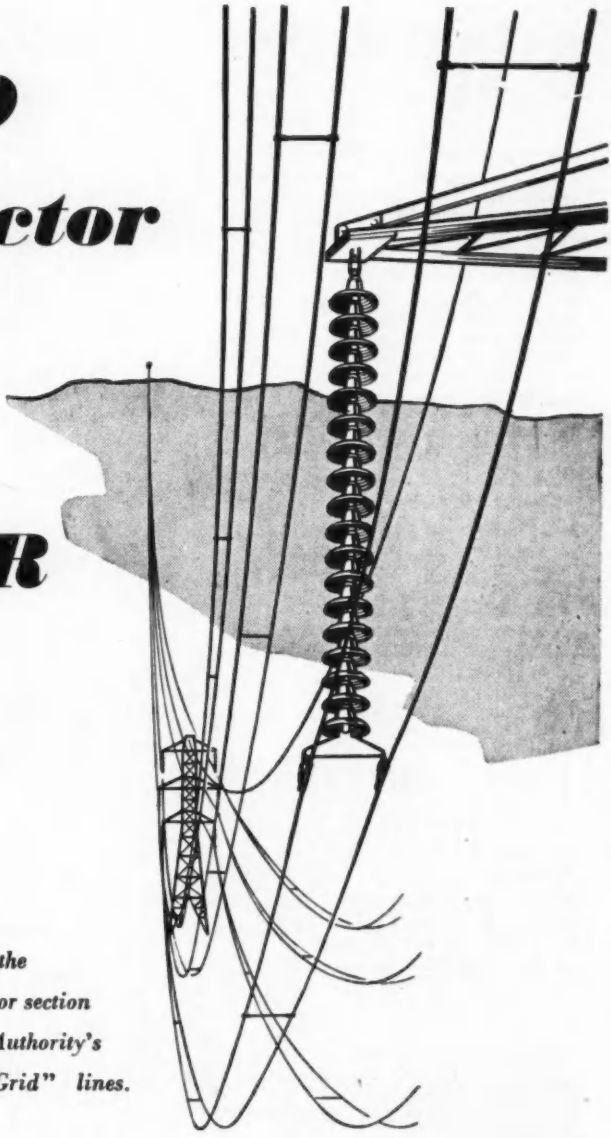

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"And very strong too, Mr Downs."

"*It's like the lens ring for an electric torch we made recently, Mr Ash. That had to be completely transparent, perfectly accurate, and at the same time decorative and strong enough to stand up to rough treatment.*"

"How did you manage all that, Mr Downs?"

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"So now the customer has seen the light, Mr Downs."

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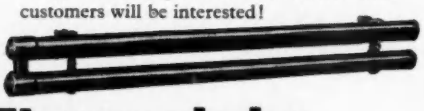

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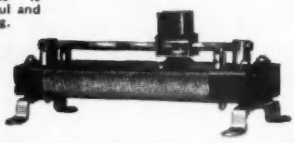

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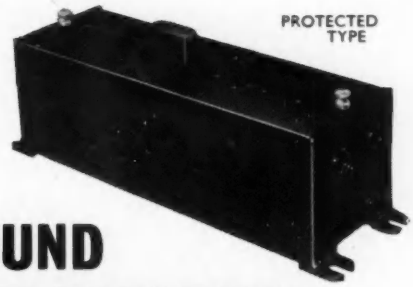

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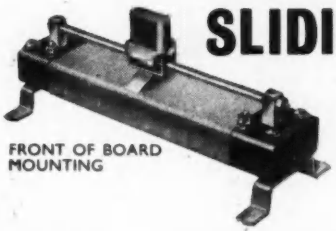

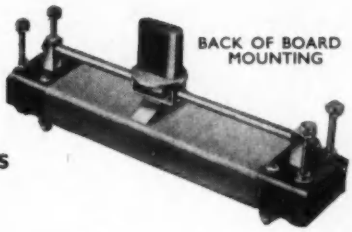

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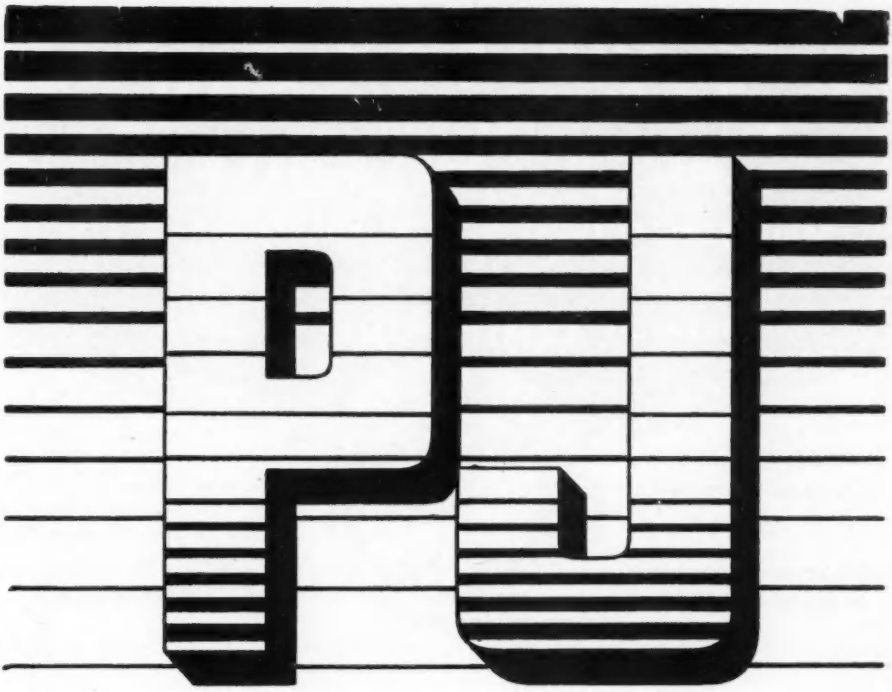

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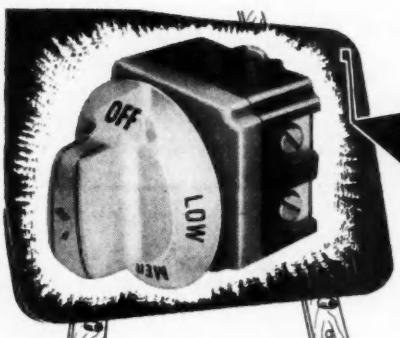

Technique is not restricted to the art of cooking. It also embraces the quality and performance of the controls, by the intelligent use of which the best results are obtained and rightly judged.

a Question of cooking technique

A learned professor may develop his theories on heat output, convection currents, heat losses etc., but British housewives are proud of the fact that even on meagre rations, they can still provide an appetising and wholesome meal quickly, cleanly and cheaply cooked.

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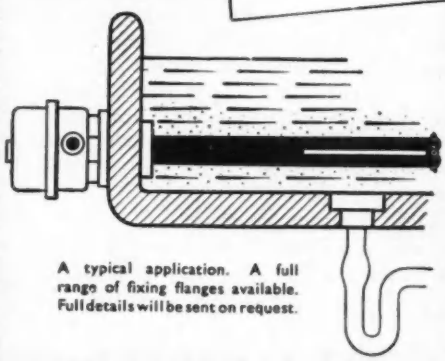
The Santon 'G' Heater

remains undamaged and fully effective even though switched on in air, the water supply fails, or the water boils away, because the automatic cut-out will immediately switch off the current eliminating all possibility of burning out the elements.



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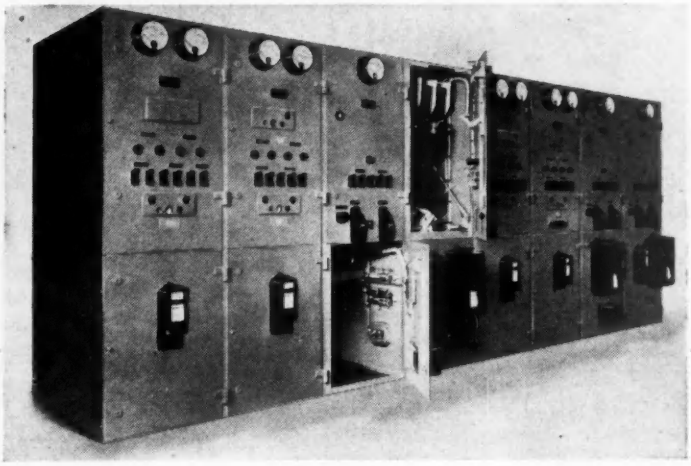

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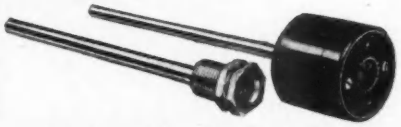

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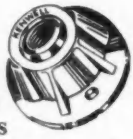

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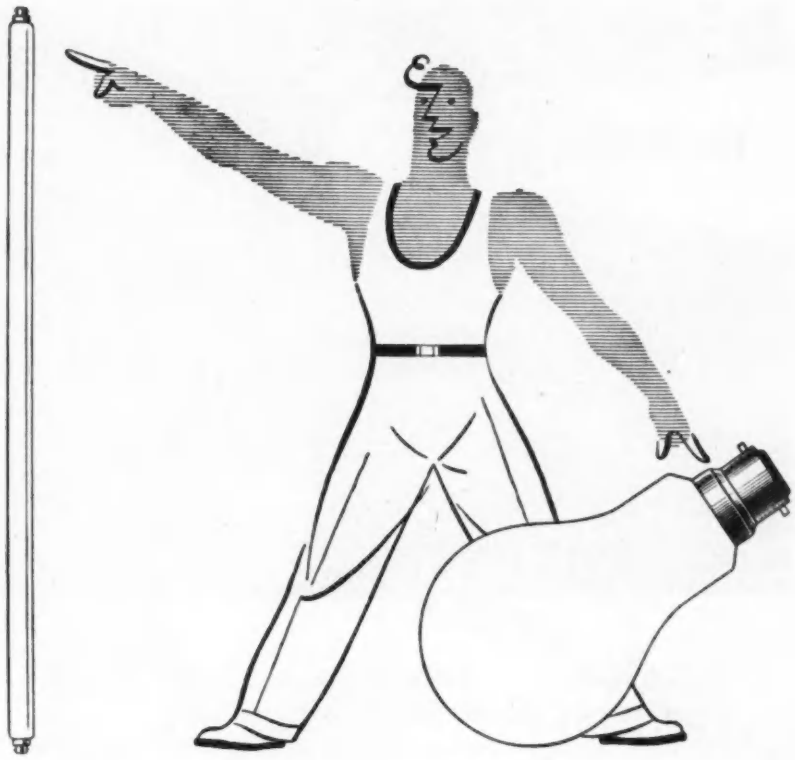

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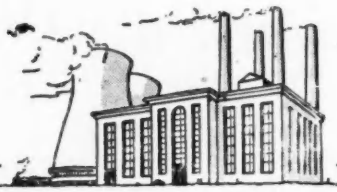

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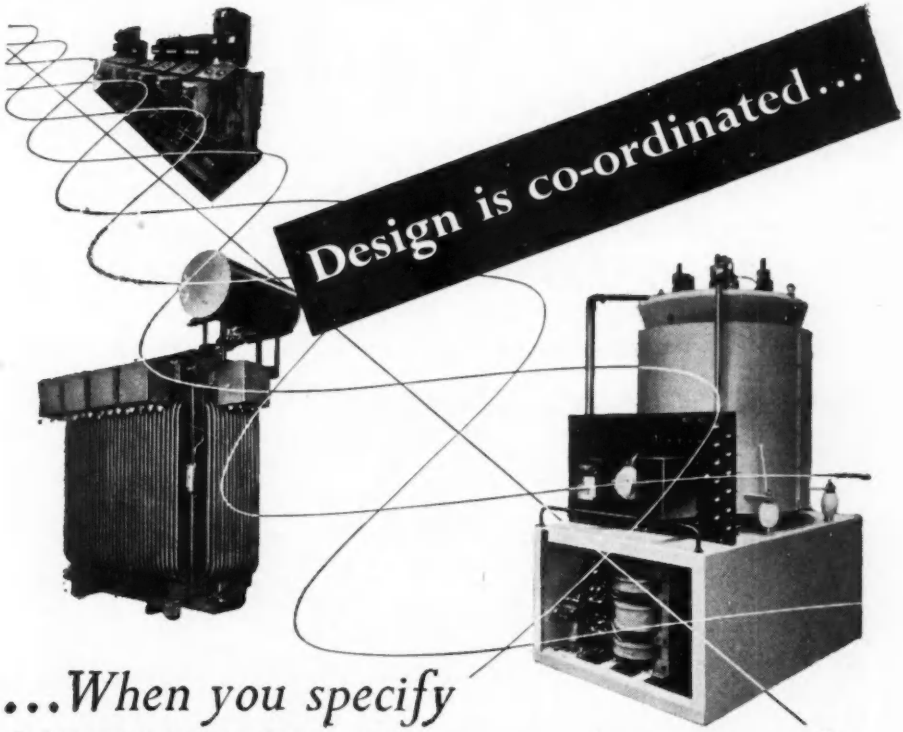

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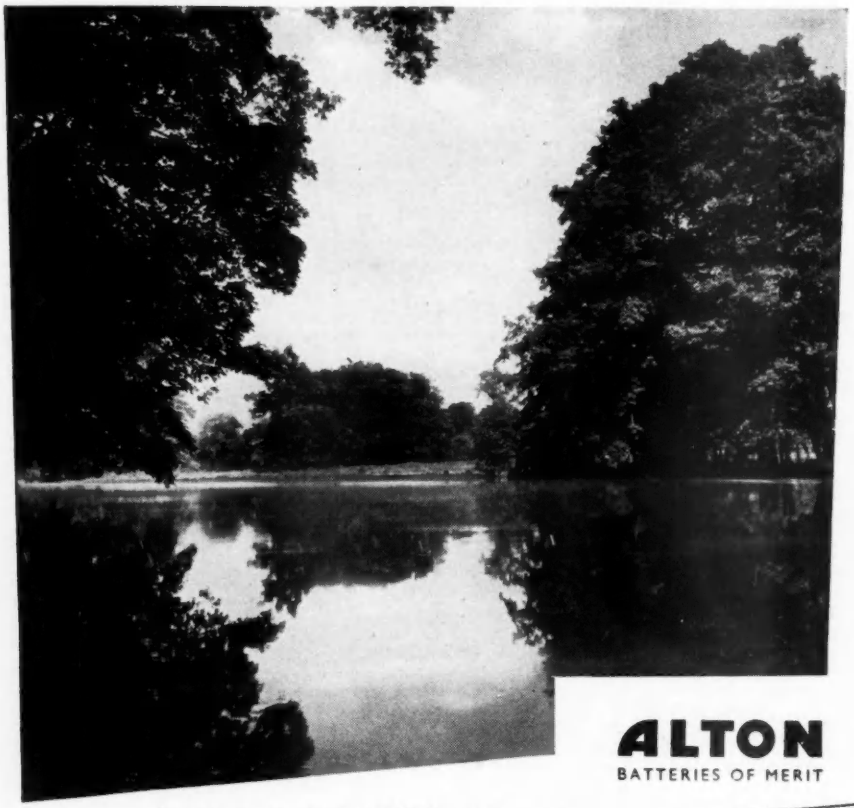

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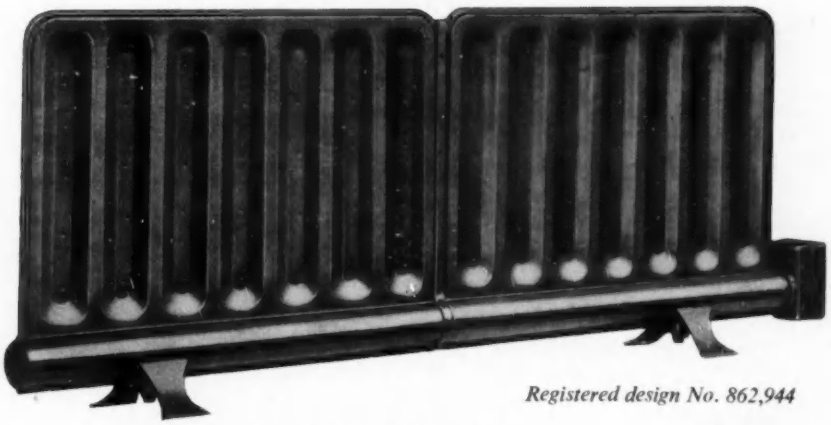

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Dimensions : 28″ × 20″

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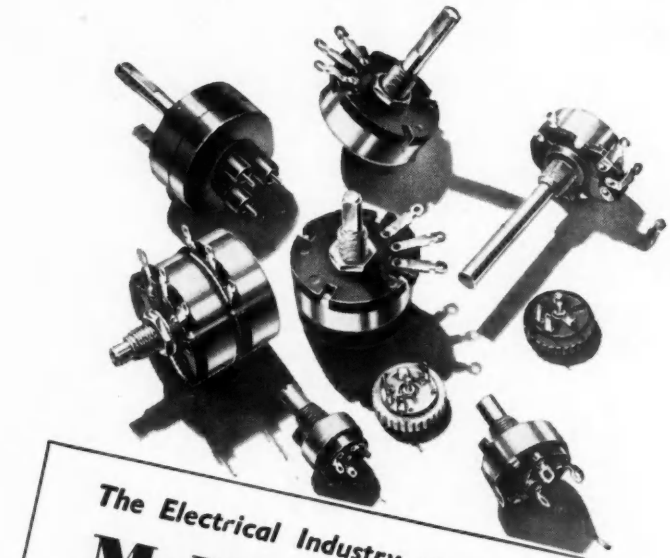

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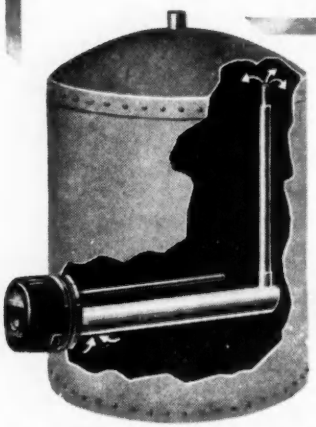

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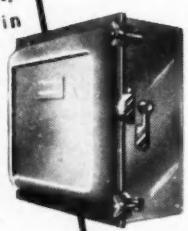

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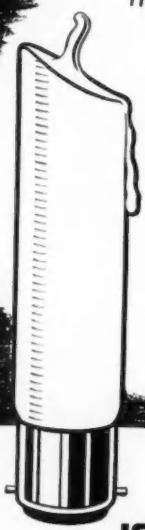

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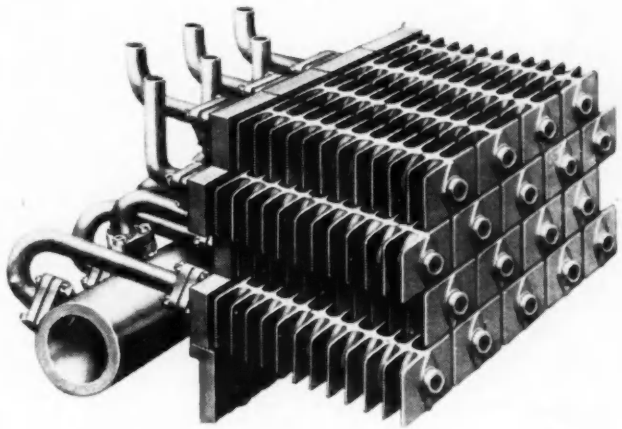

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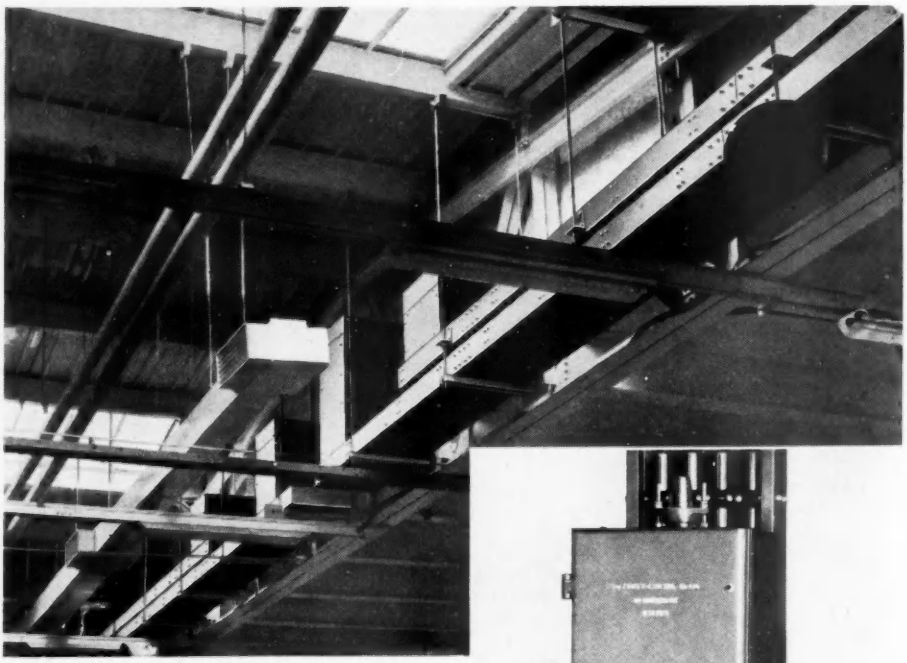

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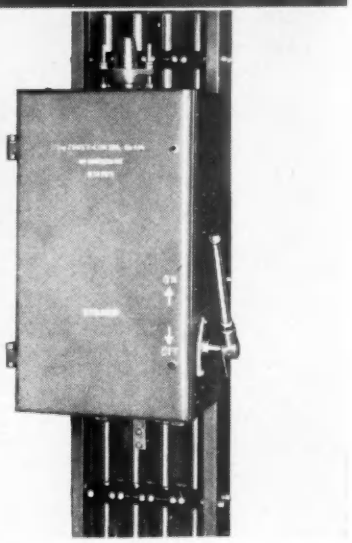
— OVER 2½ MILES —

of 1600/1250 amp. Metalclad Busbar Trunking installed in Vauxhall Motors Ltd. new factory, Luton, by Messrs. Holliday, Hall & Stinson Ltd., Electrical Contractors, London



The above illustration shows a 300/500 amp. H.R.C. Tap-off Switch/Fuse Unit mounted on a section of 1250 amp. trunking.

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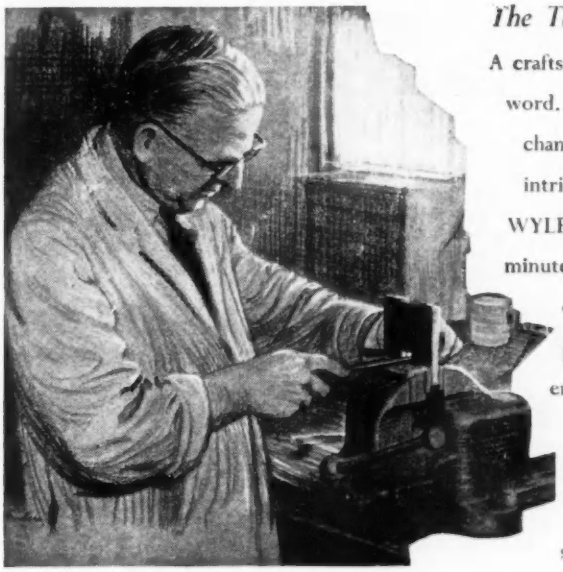

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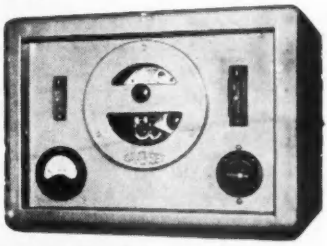

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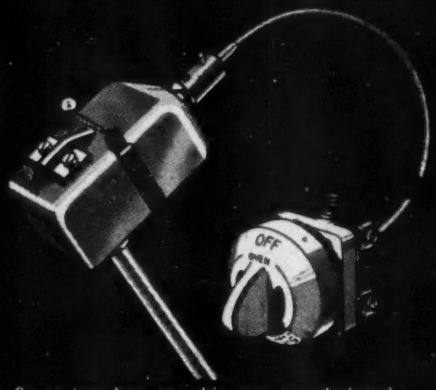
WITH FLEXIBLE DRIVE



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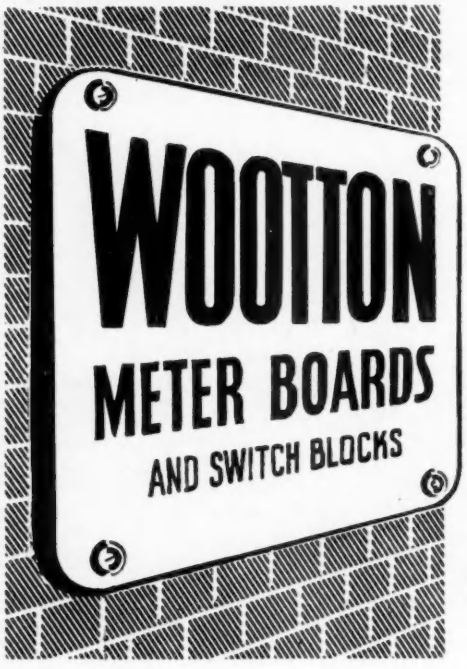

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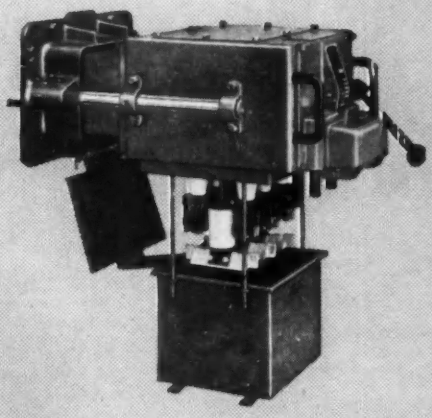

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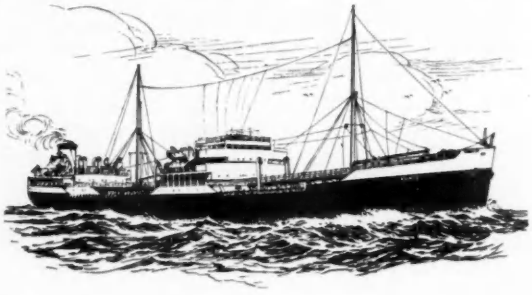
(*The Anglo-Saxon Petroleum Co., Ltd.*)



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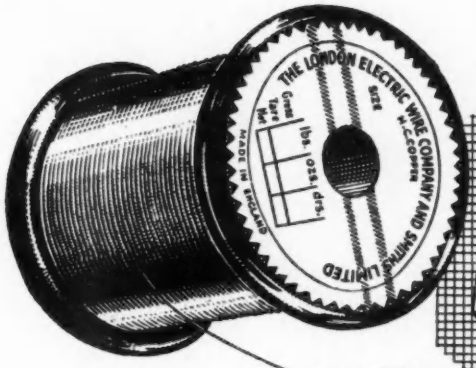

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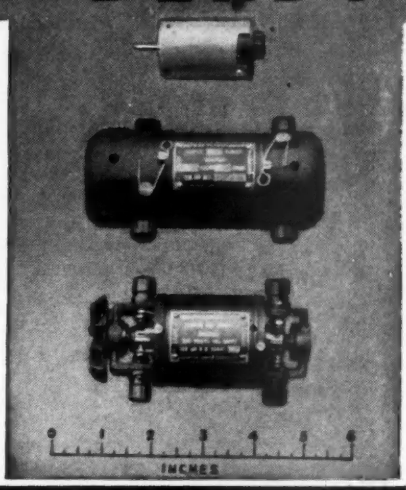

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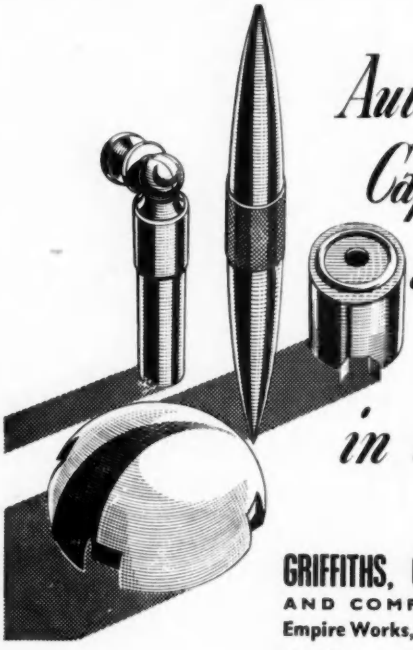

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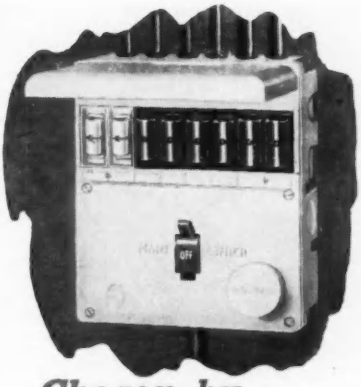

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Fyramid construction gives "all over" contact. Arrows indicate heat capacity.

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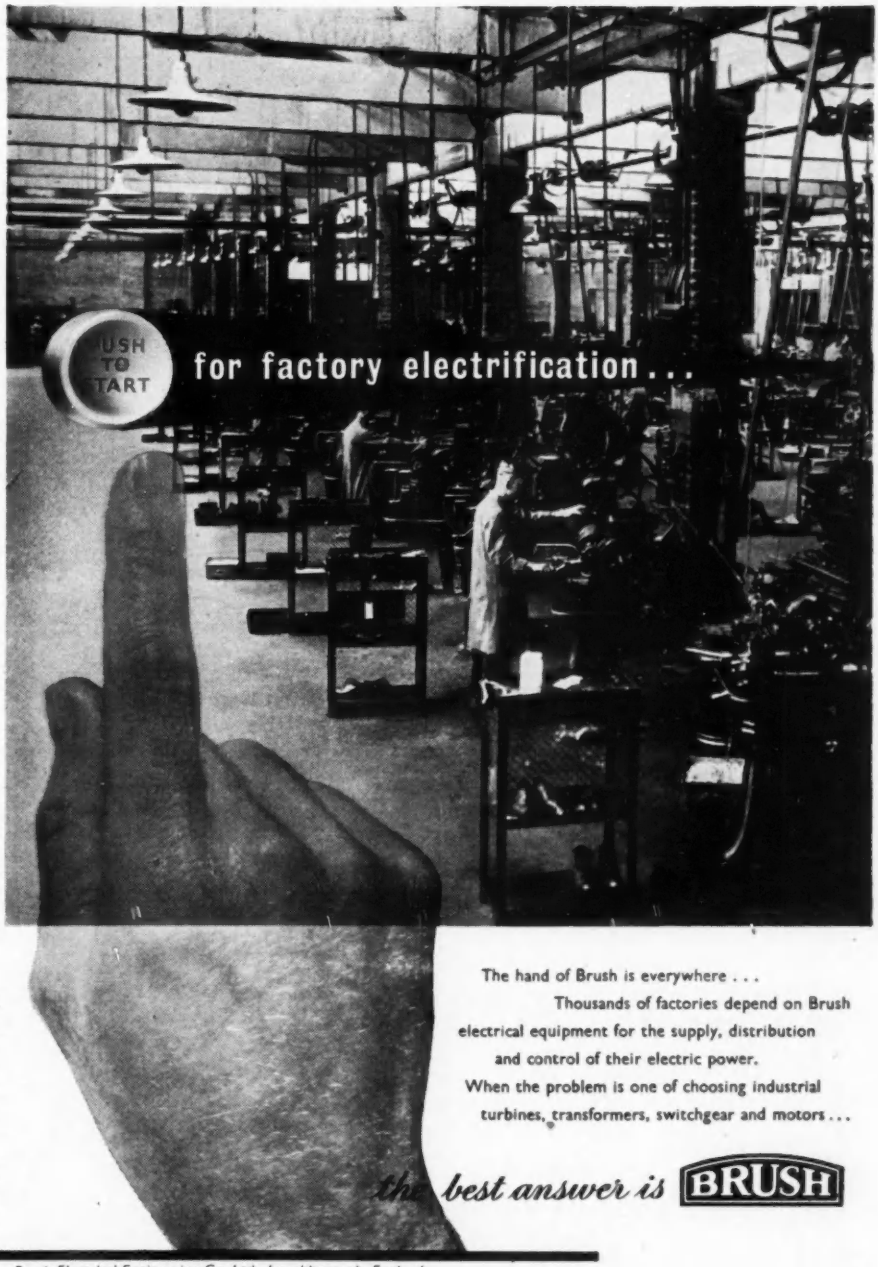

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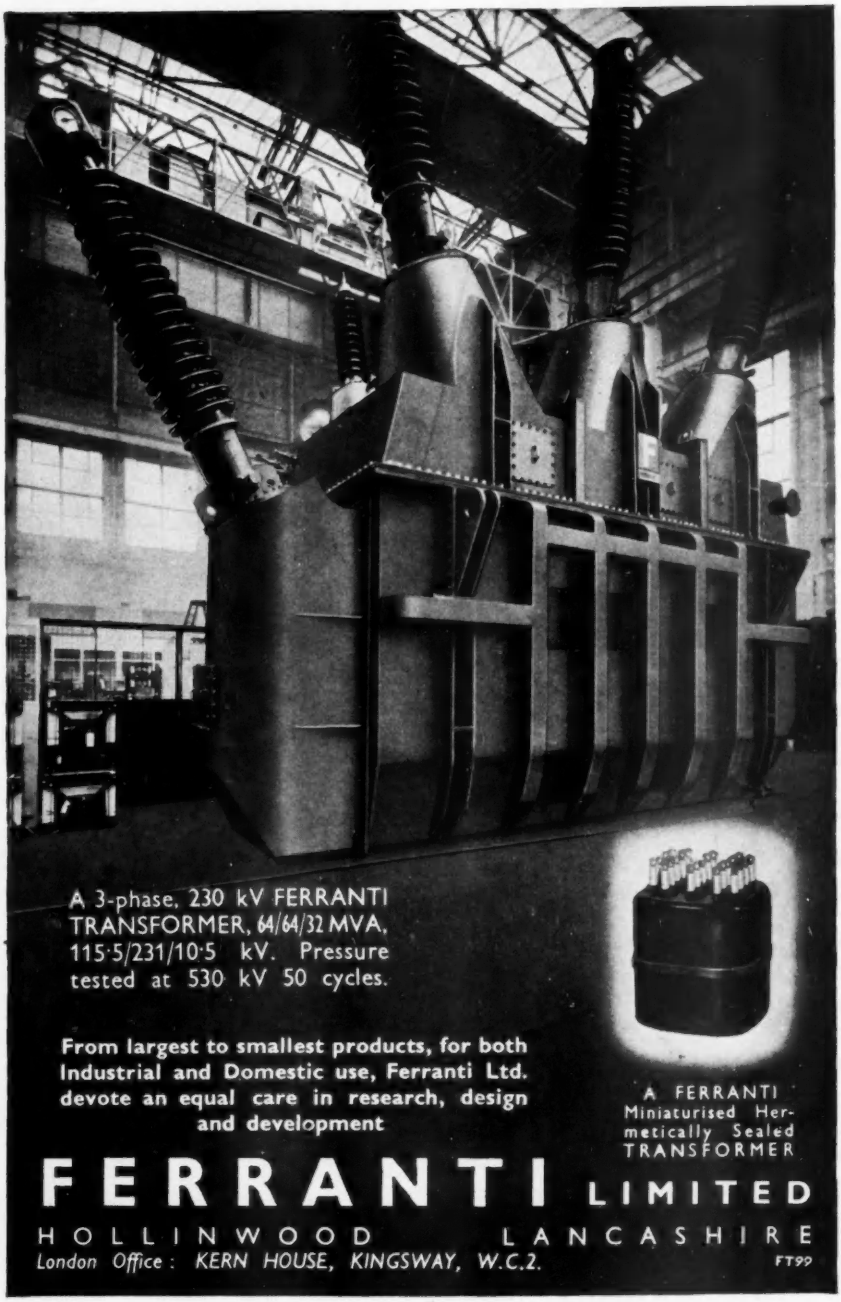
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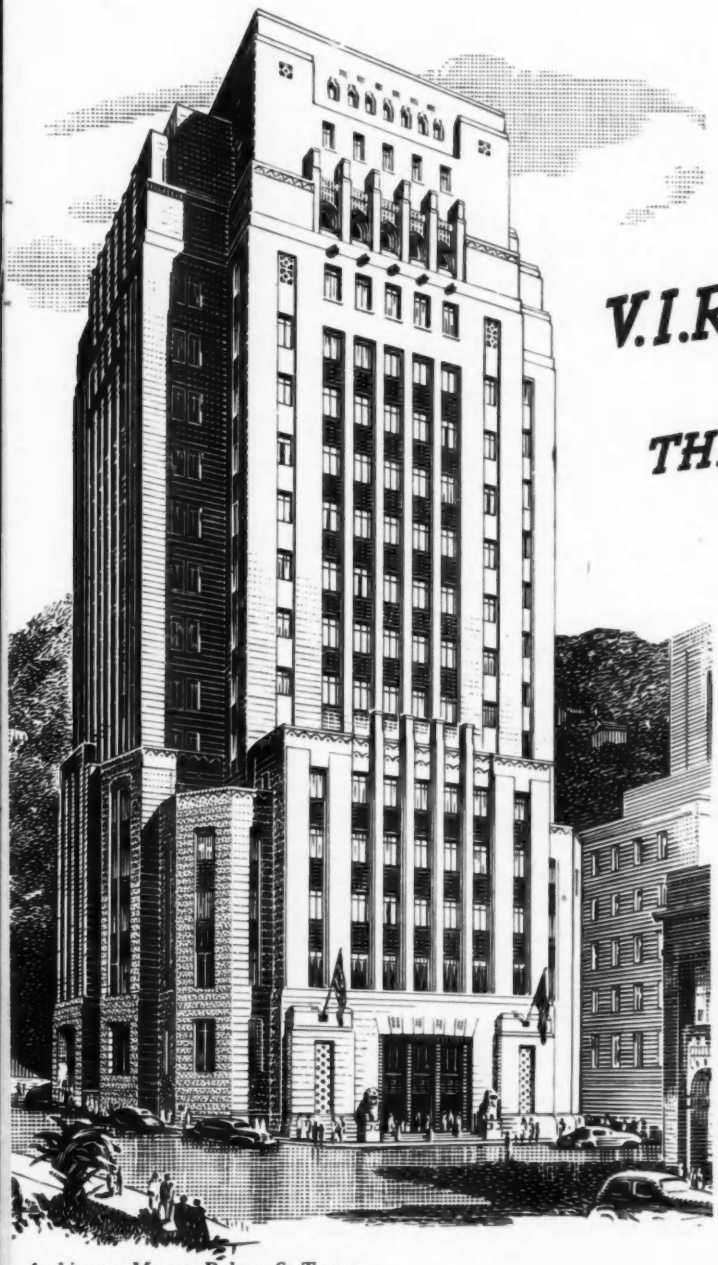

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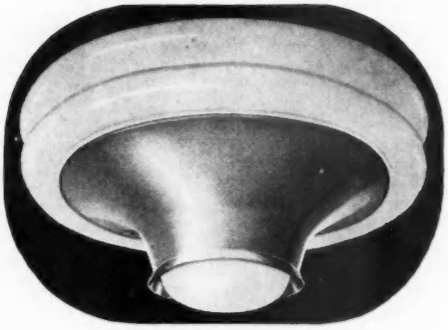

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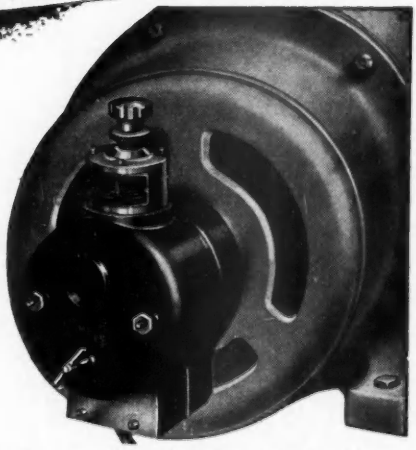

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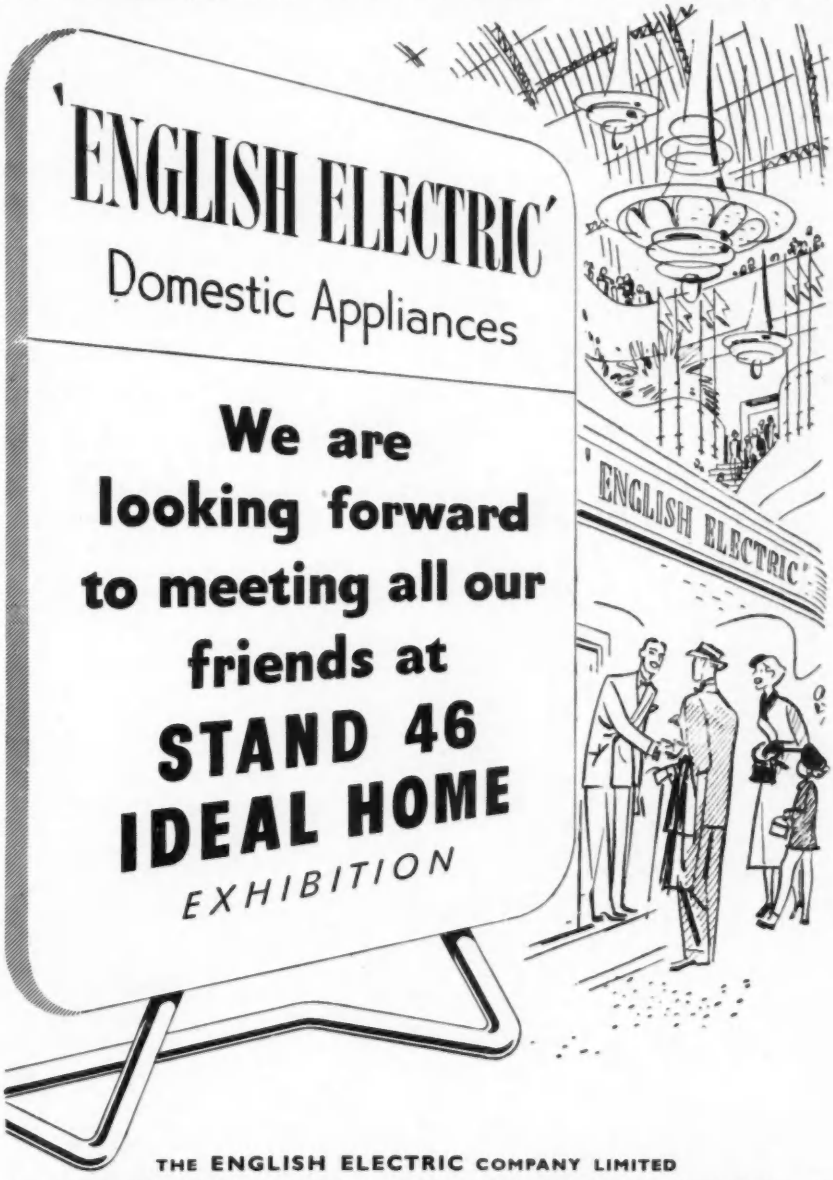

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ELECTRICAL TIMES

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Editorial

COAL AND THE HOUSE

ONLY one concrete result came from last week's Commons debate on the efficient utilisation of coal: the Government agreed to adopt a rather pale shadow of the F.B.I.'s request for long-term low-interest loans to finance the thermal insulation of plant and the installation of fuel saving equipment. They will now consider loans at full interest rates to firms undertaking such fuel economy activities. But this is not the full measure of the value of a well-informed debate. There was a welcome sign in the speeches made that some moderation was being applied to estimates of the possibilities of fuel saving. As Mr. Geoffrey Lloyd put it there are "enormous physical difficulties in achieving higher efficiency." That is a truism too often forgotten when calculations based on calorific values are used to support grandiose schemes. Equally important as a sign of realistic thinking is the emphasis by the Minister that a fuel co-ordination policy must be firmly regarded as a means to an end, and that freedom of choice must be maintained. Such statements should act as valuable correctives to the excessive claims of the exponents of the virtues of solid fuel appliances in the home, from which, it is emphasised, coal savings can in any case only be small compared with the contributions possible if industry does its utmost to secure economy in the use of fuel.

LEARN IN INDUSTRY

CONDEMNATION of the technological university is an outstanding feature of a paper which was presented to the Institution of Electrical Engineers last week. One of the claims made for this type of training centre is that it can produce highly equipped technologists to take a responsible position in industry on conclusion of their prolonged academic studies. To the authors, such a method is most undesirable. They think that men should enter industry as soon as possible after obtaining their first degree, whether their ultimate aim be production, design or research. A formal two-year apprenticeship for all is their answer. They recognise, however, that the problem of advancing engineers to hold efficiently a responsible position in an economically short time requires more than the mere provision of apprenticeship facilities. Continued training in industry after the conclusion of graduate apprenticeship is offered as a method more effective than post-graduate university study in producing "an engineer who can make his own personal contribution to the problems facing industry." Whatever may be thought of the methods it advocates, the paper is welcome at the present time as a practical suggestion on how to combat the difficulties that the growth of technical knowledge presents increasingly to successive entrants to the electrical industry.

HYDRO HOLD-UP

REPEATED attempts to secure an unopposed second reading of the B.E.A.-promoted North Wales Hydro-Electric Power Bill have had no success in the House of Commons. With the advent of the Budget, and an over-crowded parliamentary time-table, this indicates a major delaying victory for the many opponents of the scheme, which the Bill is designed to facilitate. Because the proposals have excited an active dislike in the minds of a few M.P.s of all three principal parties, there seems little chance that a smooth second reading will be secured by modifications to the details of a few clauses in the Bill: it is the basis of the scheme that is being attacked, both on economic grounds and from the aspect of amenities. In these circumstances, the Bill cannot advance on its way to the statute

book until time can be found for a full-scale three-hour debate on the floor of the House. Unless the Government decide to attach great importance to the scheme, it seems unlikely that such a debate can take place until the financial business is out of the way in July. Then, if a favourable vote is obtained, a circumstance which may again turn on the strength of official backing, there will be further objections to face in committee from interested organisations. So work in North Wales seems unlikely to begin for some time. There is no doubt that the objectors have a right to be heard, but unfortunately, all the time the delays they occasion continue the costs of the scheme are rising.

THE TELEVISION CONVENTION

THE I.E.E. Television Convention, to be held at the end of next month, falls at a particularly opportune period in the history of television in the United Kingdom. By that time, the third of the television transmitting stations, Kirk o' Shotts, will have gained part of its quota of viewers, and the television coverage will be about 70% of the population of the country. With this remarkable feat achieved, it is only fitting that the pioneer work carried out by Great Britain in developing this powerful entertainment and educational medium should be placed on record. There can be no doubt that many of the Continental countries, who are at present considering the introduction of a national television service, will be able to benefit by the wealth of information provided in the numerous papers, and what is even more important is the presentation to their delegates of the system in operation. In arranging this Convention, the I.E.E. is performing a most useful service, and at the same time is ensuring that the British contribution to television will not pass unnoticed.

WARMTH AT CHURCH

HEATING by electricity presents its strongest case when the duty is intermittent: where is this more so than in a church, with its accent on Sunday services? It is this consideration that adds particular interest to a recent symposium in which hot-water, gas and electric methods of church heating were discussed before the Institute of Heating and Ventilating Engineers. In its results, the paper on electric methods supports the claim that they are effective, and in the considerations it presents, epitomises several of the particular advantages of the electric heater. Some general principles are advanced, too. The installation should use the flexibility that electricity offers; when short times only have to be considered, the man rather than the building should be heated; some radiant heat should, if possible be incorporated. All these aspects of the method can with benefit be borne in mind when different problems are being tackled. The fact that electricity has been widely applied to give satisfaction in a notoriously difficult task where costs must be cut back as much as possible, remains a valuable recommendation of its worth as a heating medium.

CUSTOMER OR CONSUMER?

AN unusual toast, that of "Our Customers", was given at the annual dinner of the Ipswich and District Electric Club. Perhaps more surprising, it was proposed by the chairman of the South Western Electricity Board, who was hardly likely to find a single one of his customers so far afield. However, Mr. Steward made the occasion one for a homily on the importance of the right attitude of mind towards "customers", a word which he much preferred. By tradition the customer is always right, but at the present time, the consumer is considered always wrong. The whole speech was a useful reminder to the supply industry that it still has a service to sell and in consequence must develop a suitable mental approach towards consumer relations. It is a not uncommon experience that under the present restrictive conditions, it is too easy to become lax in dealing with consumers and it may well be that a change to the word "customer" may be conducive to developing the right sales mentality.

Meteor

LONG LINE TRANSMISSION

The solution of operating problems by means of nomograms

By E. B. POWELL, M.Inst.C.E., M.I. Mech.E., M.I.E.E.

ENGINEERS associated with the operation and design of long electrical transmission lines often wish to know the voltage levels and losses that may occur under varying operating conditions. A number of well-known expressions have been made available for making the necessary calculations, but it is usually found that the work involved in their application is inclined to be not only tedious, but, due to the amount of arithmetic involved, the risk of mistakes being made, even by experienced engineers, is always present.

This weakness has been appreciated ever since the possibility of transmitting electrical power over long distances was first envisaged, and a number of charts and diagrams have accordingly been designed by various recognised authorities, which can be used for accurately solving transmission problems without having to carry out tedious calculations.

These transmission charts are usually drawn to cover typical lines operating at one specific voltage, so in order to cover all the voltage levels between, say, 33 kV and 275 kV a very large number of charts will be required. This fact is to some extent a deterrent to their universal adoption.

The number of charts required could, of course, be considerably reduced if one is prepared to accept solutions that are correct only within practical limits. In fact, any attempt to obtain an exact solution of a problem which must of necessity be based on a number of assumptions in regard to the voltage and load flows is, in itself, difficult to justify.

The writer has used simplified charts for many years based on approximate equations for solving long line problems, since they were easier to read and covered a much wider field than those based on more exact equations. The results obtained were found to be sufficiently accurate for all practical purposes.

These charts have recently been modified to cover all transmission problems on systems operating at voltages between 33 kV and 275 kV, and the basis on which they are constructed is described below with a hope that they will be of interest to other engineers associated with long line transmission problems.

Line Losses

The most satisfactory method of dealing with transmission problems is to express the parameters on a percentage or unit basis, since by this means the calculations are simplified considerably.

The basis chosen when constructing the nomograms was 100 MVA, 132 kV and a standard 90 MVA, 132 kV overhead line with one conductor per phase having an equivalent copper cross-section of 0·175 sq in.

Before proceeding further it might be advisable to explain, for the benefit of those not already familiar with this method, exactly what is meant when one says that the reactance and resistance are expressed on a percentage or unit base. If, for example, a current of 438 amps, which is equivalent to 100 MVA at 132 kV, is passed through a reactance of 100 ohms, the voltage drop will be 43,800 V. This voltage drop is $\frac{43{,}800 \times 100}{76{,}200}\%$ of the phase voltage, i.e. 57·5% or, on a unit base, 0·575. So instead of saying the reactance was 100 ohms, one would say it had a unit value of 0·575 where the value of the unit is 100 MVA and 132 kV respectively.

If only 50 MVA was passed through the reactance the voltage drop would be $0{\cdot}5 \times 0{\cdot}575 = 0{\cdot}2875$ of the supply voltage.

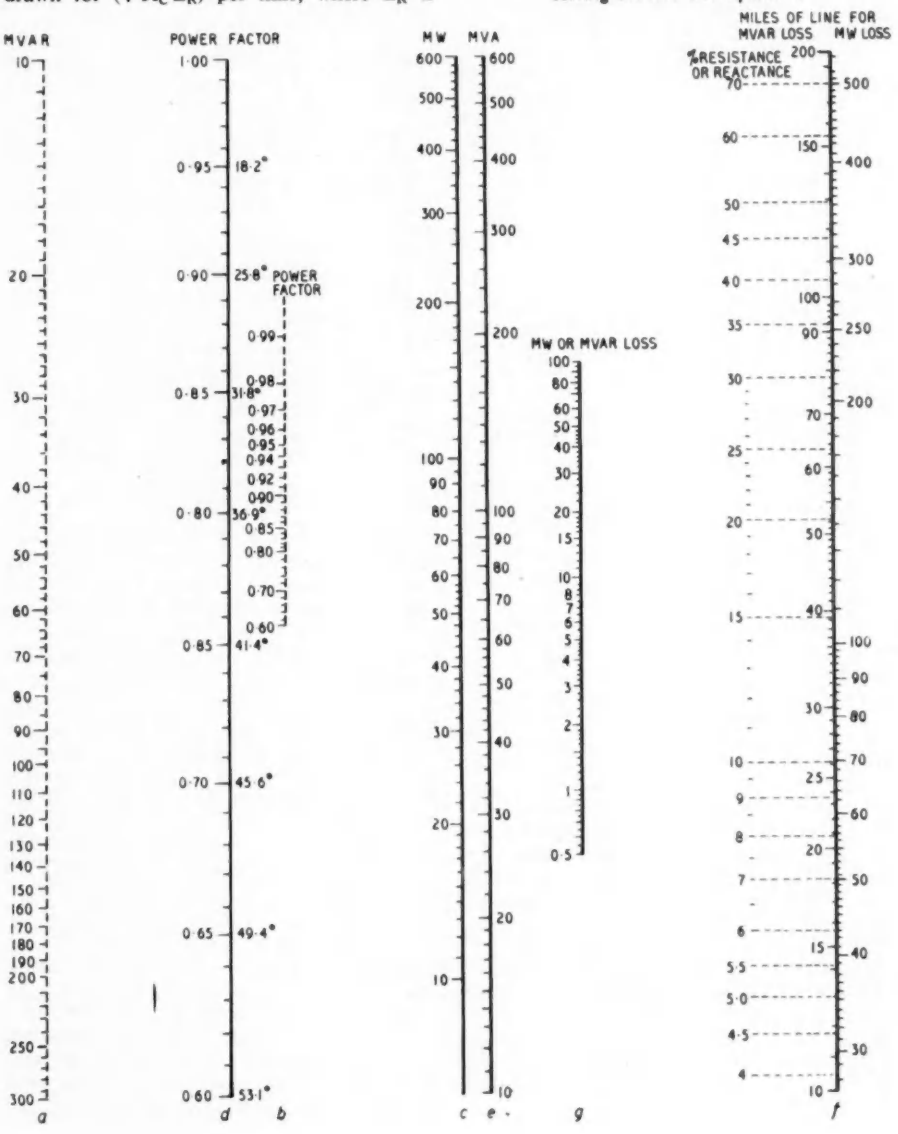
The great advantage of this system is that one can convert a reactance or resistance of one voltage to that of another by simply multiplying the value by the square of the ratio of the two voltages. For instance, the unit value of the above reactance when used on a 66 kV system would be $0{\cdot}575 \times \left(\frac{132}{66}\right)^2 = 2{\cdot}3$ or 230%.

The nomogram illustrated in Fig. 1 is constructed for solving the loss equations which are for all practical purposes equal to $(MVA)^2R$ and $(MVA)^2X$, where R and X are the resistance and reactance of the line expressed on a percentage basis. The losses obtained from these expressions are almost exact when the effect of charging current is small and can

be neglected. The key for using this nomogram is shown in Fig. 2.

In the case of MW loss the effect of charging current even on long lines can be neglected, but when calculating the MVAr loss some allowance should be made for the charging MVAr of the line. The value of this charging MVAr can be obtained within practical limits from the curves of Fig. 3 which has been drawn for $(\sqrt{3}I_C E_R)$ per mile, where E_R is the receiving end voltage, which, in this instance, is 132 kV. This chart ignores the fact that the sending end voltage may be higher than that at the receiving end, but the error introduced is small in practical transmission problems. In the case of long lines the transmission system is operated so that

Fig. 1. This nomogram is used (see Fig. 2) for solving the line-loss equations



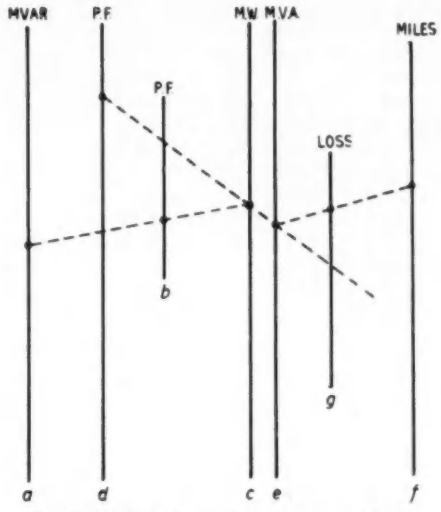


Fig. 2. Method of use of nomogram in Fig. 1

E_S and E_R differ very little from each other, while on short lines, where there may be a greater difference between the terminal voltages, the charging MVAr is small, so any error introduced is of negligible importance.

The reactance and capacitance of overhead lines can be calculated from the following expressions:—

$$\text{Reactance in henries} = 0{\cdot}741 \times \text{Log}_{10}\frac{D}{r}$$

Where D is the spacing between conductors and r their radius

The capacitance in microfarads is=

$$\left(\frac{3{\cdot}88 \times 10^{-2}}{\text{Log}_{10}\dfrac{D}{r}}\right)$$

The value of $\text{Log}_{10}\dfrac{D}{r}$ can for all practical purposes be assumed to be the same for all lines with one conductor per phase operating at voltages between 33 kV and 275 kV. The reason for this is that on the higher voltage lines the spacing D is increased, while the radius of the conductor has to be increased roughly in proportion to the spacing if corona losses are to be avoided. On a lower voltage line where the value of D is small, the power that can be economically transmitted is also small with the result that the radius of the conductor is reduced in approximately the same proportion as the spacing D. The reactance values of typical lines of different voltages is given in Table I.

TABLE I. REACTANCE OF VARIOUS SINGLE CONDUCTOR 50-CYCLE OVERHEAD LINES

Voltage (kV)	Conductor size (equivalent copper) *sq in.*	Reactance per mile *ohms*
33	0·10	0·64
	0·15	0·61
66	0·15	0·61
	0·175	0·60
132	0·132	0·67
	0·40	0·665
220	0·30	0·66
	0·40	0·655
275	0·40	0·66

Fig. 3. Value of equivalent lengths for changing MVAr

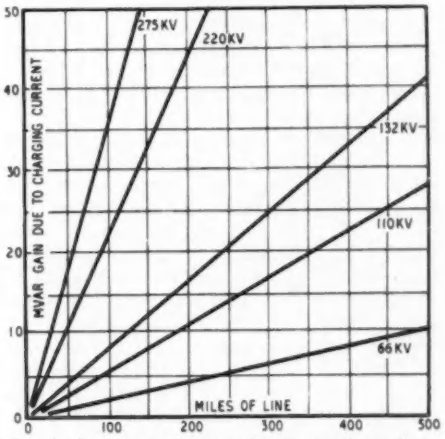
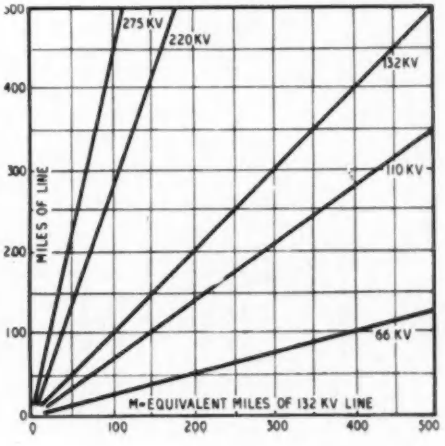


Fig. 4. Equivalent lengths of various voltage lines in terms of 132 kV



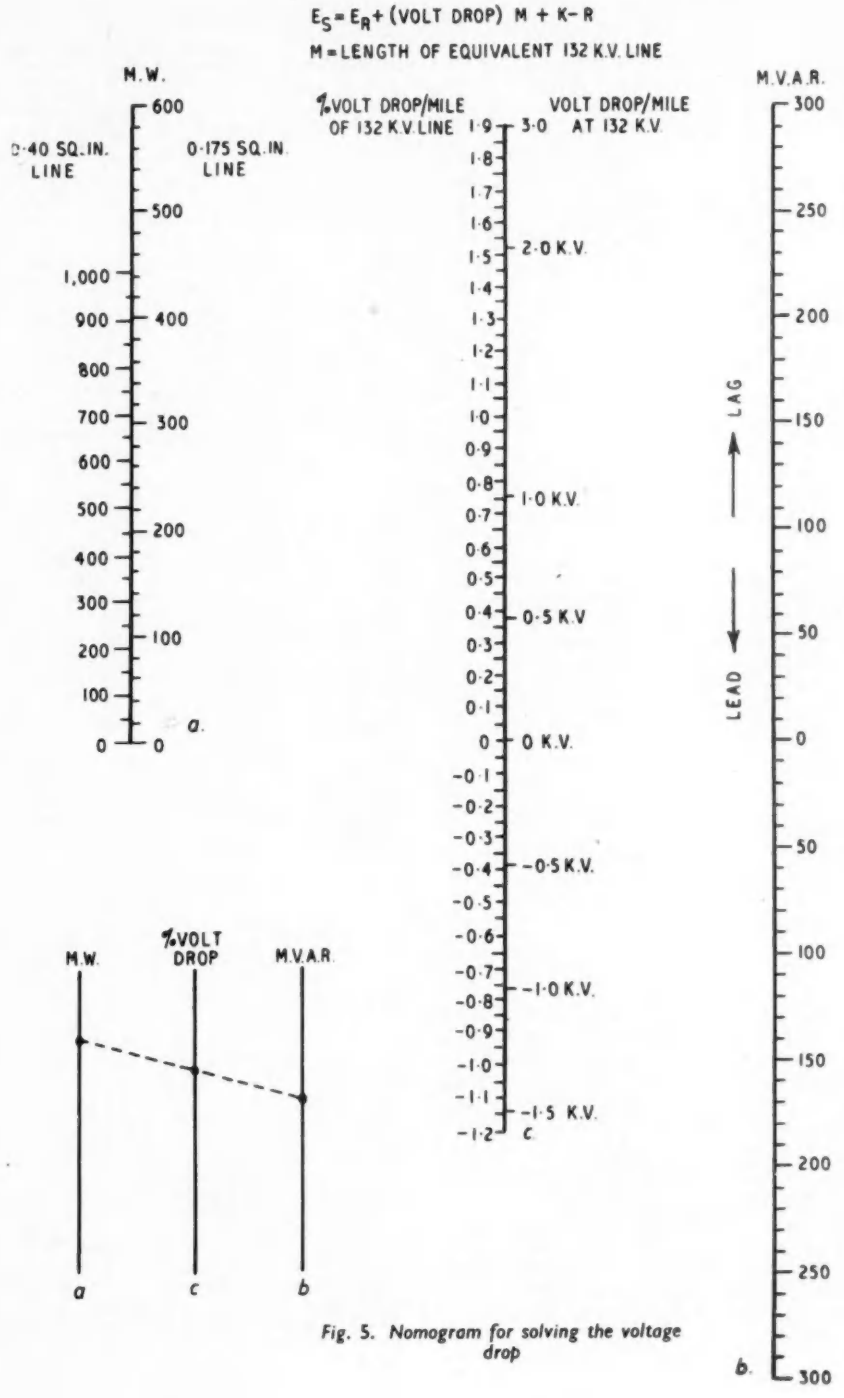


Fig. 5. Nomogram for solving the voltage drop

It is seen that the reactance per mile will vary between 0·6 and 0·67 ohms so very little error will be introduced if one assumed that all the lines have a reactance of 0·66 which is the value for which the nomograms have been constructed in order to cover, in the main, lines operating at 132 kV and above. In any case where the resistance and reactance values appreciably differ from that used in the construction of the chart it is simple to make the necessary adjustment to the losses obtained by means of a slide rule. Due to the fact that the chart has been constructed on a unit basis it is possible to use it for any line voltage E by multiplying the length of the line by the ratio $\left(\frac{132}{E}\right)^2$. The values of these equivalent lengths is shown in Fig. 4, while in Fig. 3 the variation in charging MVAr with voltage is also shown.

Natural Power of a Line

It can be shown that when the power being transmitted by a line is equal to $\frac{E^2}{Z}$ where E is the nominal voltage of the line and Z the surge impedance, the charging MVAr dissipated along the line is equal to the MVAr loss on the line. This load is known as the natural or surge impedance load.

Thus, for all practical purposes when natural power is flowing the power factor at the receiving end is unity and is independent of the length of the line. The value of Z in the case of 132-275 kV lines with one conductor per phase is 380 ohms.

The nomogram (Fig. 1) can be used for obtaining the "natural power" by making the MVAr loss equal to the MVAr gain, the latter being obtained from Fig. 3. For instance,

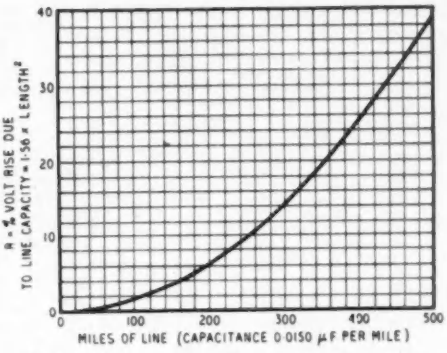


Fig. 7. Curve to show percentage voltage rise

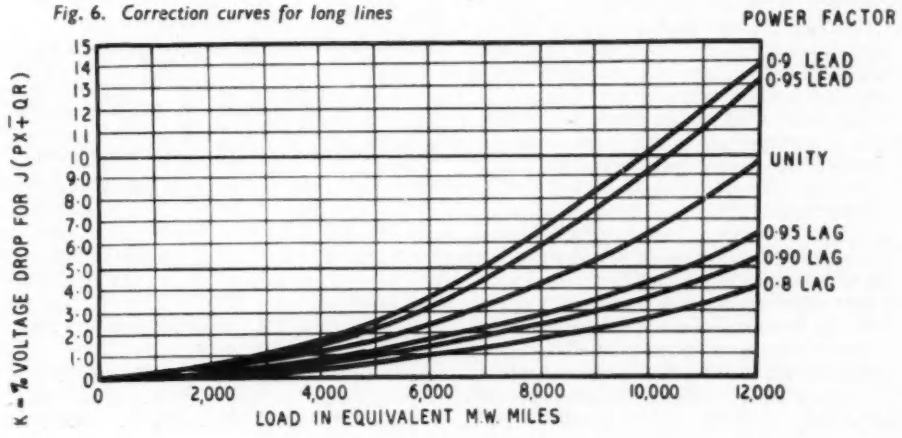
on a 132 kV line the natural power from $\frac{E^2}{Z}$ = (46 MW). If the line is 50 miles long 4 MVAr will be required to charge the line so 4 MVAr must be lost when transmitting "natural power." From the nomogram it is seen that on a line 50 miles long with 4 MVAr loss the power transmitted with unity power factor at the receiving end is 47 MW. The same result would have been obtained for a line of any other length. The "natural power" at any other voltage can be obtained directly in the same manner.

In practice it is unlikely that the information available will be given in MVA so additional lines have been added to the nomogram for MW, MVAr and power factor. This enables the MVA to be obtained no matter in what form the information is given.

Line Voltages

In order to complete the solution of the problem it is necessary to know the voltage drop

Fig. 6. Correction curves for long lines



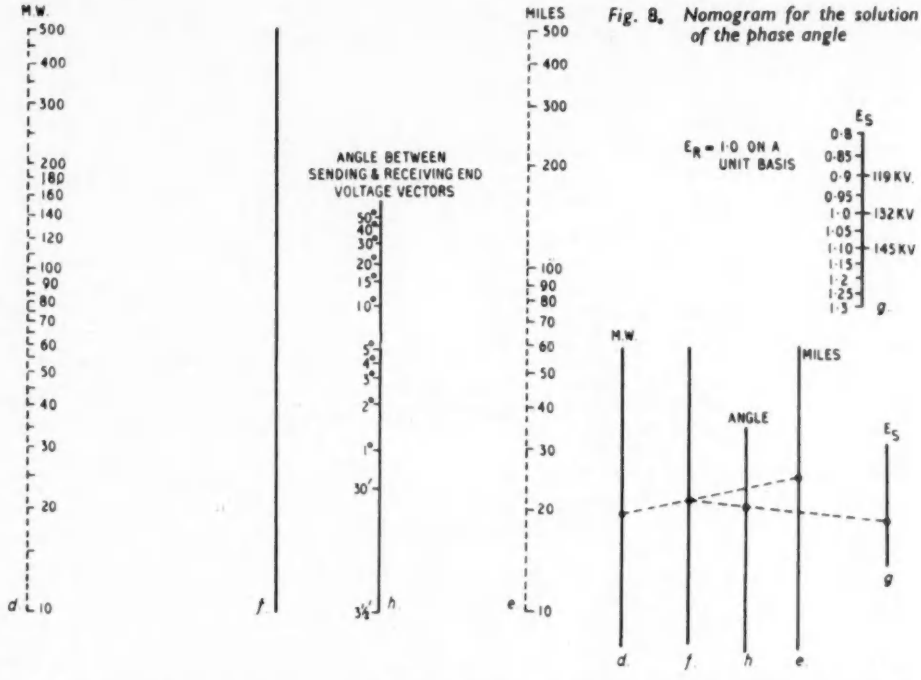


Fig. 8. Nomogram for the solution of the phase angle

on the line and the angle between the sending and receiving end voltages. The voltage drop is made up of (impedance drop in the line)− (voltage rise due to the capacitance). The impedance drop is obtained from $(P \mp jQ)(R + jX)$. Where $-jQ$ denotes a lagging power factor.

This can be re-written as $(PR \pm QX) + j(PX \mp QR)$. The value $(PR \pm QX)$ gives the voltage drop within −2·5% for loads up to 5,000 MW miles for power factors between 0·707 lagging and 0·9 leading. It is this expression that is solved by the nomogram Fig. 5 for lines one mile in length with conductors having equivalent copper section of 0·175 sq in. and 0·4 sq in. The total voltage drop is obtained by multiplying the result by the length of the line. If the line is long and transmitting large blocks of load the error due to neglecting $j(PX \mp QR)$ may be considerable. It is, therefore, necessary to include a correction curve so that an allowance can be made for the value of $j(PX \mp QR)$, and this is shown in Fig. 6.

This graph has been constructed for a line with an equivalent copper conductor of 0·175 sq in., but can be used for other sizes of conductor without introducing an error of more than ± 0·5% under the heaviest loading conditions. The voltage base for the graph is 132 kV but it can be used for any voltage by expressing the length of the line on an equivalent 132 kV base which is obtained from the graph Fig. 2.

By means of the nomogram and correction curve the impedance drop on any line can be obtained within ± 1% under all operating conditions normally met with in practice. If one wished it would be a simple matter to include scales on the nomogram to cover the cases where the cross-section of the conductors were say 0·15 sq in. and 0·30 sq in.

Voltage Rise due to charging MVAR

From a normal π circuit of a transmission line it is assumed that half the charging current flows through the line and the voltage rise due to this current (neglecting resistance) is equal to $\frac{jI_cX}{2}$ where $\frac{I_c}{2} = \frac{j\omega C l E_R}{2}$ and $X = j\omega L l$ where l is the length of the line in miles.

LC can be written as $(0{\cdot}741 \log_{10} \frac{D}{r}) \times \left(\frac{3{\cdot}88 \times 10^{-2}}{\text{Log}_{10} \frac{D}{r}}\right)$ then by substitution the voltage drop can be simplified to $-1{\cdot}41 l^2 (E_R 10^{-6})$ or expressing it on a percentage basis equals $-1{\cdot}41 l^2 10^{-4}$. This expression is shown in

TABLE II. COMPARISON BETWEEN RESULTS OBTAINED BY EXACT SOLUTION AND FROM CHARTS (E_R AND E_S EXPRESSED ON A UNIT BASIS)

EXAMPLE					MW LOSS		MVAR LOSS		SENDING END VOLTS E_S	
No.	E_R kV	Length	Load at E_R	Power factor	Exact	Chart	Exact	Chart	Exact	Chart
1	132	100	80	0·9	10·64	11·0	+19·20	+21·0	1·27/11°.21′	1·260/13°
2	132	100	80	1·0	8·97	8·8	+14·85	+16·0	1·138/15°.25′	1·136/15°
3	132	50	80	0·9	5·60	5·5	+10·20	+11·0	1·132/6°.22′	1·130/7·5°
4	132	50	80	1·0	4·55	4·5	+7·84	+8·5	1·063/8°.15′	1·060/8°
5	132	100	30	0·9	1·31	1·50	−5·14	−4·2	1·087/4°.57′	1·08/6°
6	132	50	30	0·9	0·80	0·78	−2·22	−2·0	1·048/2°.36′	1·045/3°
7	220	100	200	1·0	19·2	20	+33·8	+33	1·118/14°.21′	1·120/15°
8	132	Natural power Z = 380 ohms			Exact 46 MW	Chart 47 MW				
9	275	Natural power			200 MW	200 MW				

Fig. 7. The constant 1·41 being increased to 1·56 to make allowance for the increase in capacitance due to the presence of an earth wire.

With the information available the voltage at the sending end can be obtained as follows:—
$E_S = E_R$ + (the voltage drop from nomogram)M + the correction for $J(PX \mp QR)$ − the voltage rise due to the capacitance.
or expressing the voltages on unit basis:—
$E_S = 1$ + (voltage drop) M + K − R, where M is the length of the equivalent 132 kV line.

Phase Angle between E_S and E_R

There is no simple method of obtaining the angle correctly but it can be obtained within practical limits from the power angle equation

$$\frac{E_S E_R \sin\delta}{X} = \text{power}.$$

This equation has accordingly been used in drawing the nomogram Fig. 8 for the phase angle and gives the results within practical limits.

In order to show that the charts will solve transmission problems with sufficient accuracy for all practical purposes a number of cases have been worked out by exact methods and a comparison between the two solutions is shown in Table II. The conductor size being 0·175 sq in.

The writer has found that the most convenient layout for the nomograms and charts is to draw Figs. 1-4 and Figs. 5-8 on two separate sheets about 15 × 24 in., which are mounted on millboard. They have been regularly used in this form for about 18 months and have been found to be invaluable when a quick solution of overhead line-transmission problems is required.

The Television Network

BEHIND the three television transmission stations, all of which will shortly be in operation, lies a network of specially designed cables and radio links. Of these cables the best known are the London-Birmingham coaxial cables which follow the route of the old Roman Road. The main cable incorporates two 0·975 in. and four 0·375 in. coaxial tubes. The larger tubes are used with repeaters for two-way transmission of the 405 line television signals which require a video bandwidth of approximately 3 Mc/s, while the 0·375 in. tubes are used for broad band telephony, each tube being capable of carrying 600 speech circuits.

Between Birmingham and Manchester is a Standard Telephones and Cables coaxial cable including six 0·375 in. tubes, of which two are used for transmission of video signals, and from Manchester to Holme Moss the signals are carried by a two-tube coaxial spur cable containing two 0·375 in. coaxial tubes.

The latest link in the chain, from Manchester to Kirk o' Shotts is, however, a two-way micro-wave radio relay link which utilises a beamed radiation at a frequency of about 4,000 Mc/s. A total of seven repeater stations enables the coverage of the 250-mile distance to be carried out in a series of "jumps" of about 30 miles each.

Two-way transmission is possible and full remote supervisory and remote control is provided. The equipment for this link was also produced by Standard Telephones and Cables Ltd. Each repeater station possesses duplicate equipment for standby purposes, and emergency power supplies are available to take over in the event of a mains failure.

Our readers' views . . .

A Policy for Fires

IN the ELECTRICAL TIMES for February 28 Professor Simon says that our Load Factor is about 40% as compared with around 60% in the U.S.A. (He is here quoting the report of the Productivity Team). He then goes on to blame this on the space heating load, but later on suggests that we should improve our Load Factor "in the way adopted by the Americans," by introducing shift work.

It is probable that the use of shift work has a greater effect than the absence of heating load. It is true that some of the heating load in this country comes on the peak, but so does some of the lighting and most of the industrial power.

What Professor Simon ignores is that the use of electric heating off-peak is far greater than the use on-peak. Between-season heating will not affect the winter peak, neither will most bedroom heating.

H. J. Gibson

CHIEF COMMERCIAL OFFICER,
MIDLANDS ELECTRICITY BOARD.

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PROFESSOR SIMON'S reply to his critics is reasoned and logical up to a point, but the sting is in its tail. He says we should leave all space heating to coal and gas, and reserve electricity for industrial power or lighting. No doubt he means that coal should take over the base load of long-hour space heating, leaving gas to supply the intermittent short-hour heating load.

One is bound to agree that solid fuel is well suited for the former task, but the gas industry is in no better shape to take over any great extension of their heating load than is the B.E.A. Surely Professor Simon knows that gas undertakings are just as short of plant as we are. Gas cannot be stored in sufficient quantity to meet the present requirements of the public for more than a day or two in frosty weather. Some Boards are refusing further business on this account. Heavy peak demands on gas supply cause load shedding by pressure drop which affects consumers even more than electricity pressure cuts. Peak demands in frosty weather can only be partially met by bringing water gas plant into action which is a costly business with coke at its present value.

Any increase in gas consumption at the expense of electricity means a greater demand for the good quality coal which is used for gas making and consequently less of this coal is available for export. Can the coal saved by *not* making electricity be exported?

This seems to be the crux of the matter and no one has yet answered the following simple question: while we in the electric supply industry admit that the present thermal efficiency of producing electricity is comparatively low, could any other industry supplying heat on tap take the class of coal used by the electricity works and deliver as much effective heat energy to the consumer per ton as we do? I very much doubt it.

One wonders what the situation would be if atomic energy fired our power stations at this moment. Efficiency of production would be no higher than it is today, but I feel sure that the public would by now be exhorted to use electricity for every purpose, heating particularly, in order to conserve our existing coal measures.

Professor Simon says that the "poor quality" coal argument is irrelevant. It isn't. It is the *raison d'etre* of our case for space heating by electricity.

BM/SRHQ

LONDON, W.C.1

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Conduit Continuity

THE comments on the above subject by Mr. L. C. Parncutt, A. Huxstep and others are most welcome to us as manufacturers. We have always advocated that the size of the hexagon of male brass bushes, steel reducers and plugs should be the same.

We, therefore, respectfully suggest that B.S.31 should revise these items, and make them hexagon spanner sizes. This would mean a slightly increased use of metal, but they would be made from standard size bar, which should simplify deliveries and stocks, and should also mean the use by the makers of standardised collets and feed fingers in their machines.

We also suggest that the male brass bushes could well be reduced in length without any detriment, so saving the increase in metal caused by the increase of size in the hexagon.

We introduced a hexagon coupling many

years ago, so that a spanner could be used, and thus obviate the defacing of the body of the coupling, as so often occurs with the more usual round coupling when tightened with footprints or pliers.

With regard to the looping boxes, or multi-back-outlet conduit boxes, we suggest the use of the extension box, with side entries, or should this be too deep, and a looping box necessary, then the looping box with screwed back-outlet entries.

We agree that the B.S. looping box has insufficient space at the base for normal means of tightening a nut, even with the lightest gauge box spanner, with hexagons of the correct spanner size. We therefore again suggest that BS 31 might well be amended. The diameter of the flat portion of the base might also be enlarged if this is felt to be desirable.

H. French

(F. C. BLACKWELL & CO., LTD.)

LIVERPOOL

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Wagons on Tipplers

IN referring to the troubles in using tipplers, in your issue of February 21, a correspondent evidently does not realise that, by using self-discharging railway wagons, there would be no need to employ these huge Heath Robinsonian contraptions for performing so simple an operation as unloading a truck of coal or other minerals. In no other country are they used.

E. R. B. Roberts

ST. NEOTS

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Wiring Direct in Concrete

AS an engineer who has had considerable practical experience in the use of "Ductube" for conduit work, I would like to join issue with your correspondent Mr. T. C. Gilbert (your issue dated Feb. 28).

Apart from very considerable financial savings, both in material and labour, there are, in my opinion, two important advantages to be gained by using the "Ductube" system: first, it permits continuous jointless runs to be as long as may be desired, obviating bending and screwing; second, it provides almost complete freedom from condensation—this latter being a most important aspect of the work in modern concrete buildings.

As regards "chemical exudations," it is generally accepted by the pundits in the cement world that 99% of the chemical action set up occurs in the first 48 hours whilst the cement is "working"; the remaining 1% carrying on for perhaps 28 days.

The "pH of the waters used in aggregates" quoted by your correspondent appears rather in the light of an "intellectual red herring," bearing in mind the extremely low water-cement ratios used nowadays and the difficulty of accurate assessment of pH values.

It is seldom desirable, or even practicable, to actually place cables until the surface of the conduits have had plenty of time to dry out.

Concerning condensation; if one buries a steel tube in concrete, a considerable differential exists as between the two, and temperature changes cause considerable condensation, as is well known. The use of fibre conduit cuts condensation to a minimum as it is able to "breathe" to a certain extent. However, a concrete duct in a concrete structure moistens and dries out in step with the whole building and condensation is at an irreducible minimum in consequence.

It is thus not necessary, or perhaps even desirable, to place plastic conduit inside a preformed concrete conduit.

If it should be held desirable by some engineers to wear a belt as well as braces, then why not use P.V.C. or other plastic-covered cable, which compares roughly in price with V.R.I., rather than an expensive second conduit usually costing more than steel.

The whole aim today, in our country's condition, should be to save material, labour and costs to the consumer, such savings preferably to be shared equally between the enterprising contractor and his fortunate customer.

Sydney G. Williams

RICHMOND, SURREY.

SCHOLARSHIPS FOR GIRLS

FIVE more scholarships have been awarded recently to girls intending to make their careers in the electrical industry, it was announced by the Caroline Haslett Trust last week. Scholarships awarded during 1950 and 1951 are tenable at domestic science colleges at five centres in London and a further six in the provinces. The recent awards have been made to Miss Audrey Boon of Burgh Castle, near Yarmouth; Miss Gillian Mathison of Stourport-on-Severn; Miss Marian Mellor of Wormhill, near Buxton; Miss Brenda Wright of Bolton; and Miss Judith Wright of Burton-on-Trent.

Blasting for Line Erection

Technique of excavating Holes and Trenches in rocky soil

By R. LEONARD*

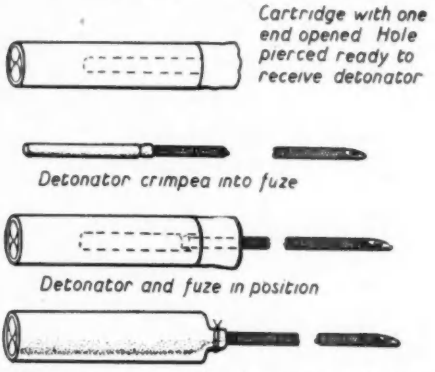
CONSIDERABLE time and labour costs can be saved when excavating pole and stay holes or cable trenches, in rock or rocky soil, by blasting, and the following notes and observations may be useful to anyone contemplating the use of explosives for this purpose but whose acquaintance with them to date has been confined to setting off fireworks.

An important thing to remember is, that although gelignite and ammonal (the two kinds most likely to be used) are safe when properly and carefully handled, familiarity is very apt to breed contempt, which is dangerous. Before the purchase of safety fuse, detonators, and explosive can be made, the local police must be approached, and if they are satisfied that the applicant is a fit and proper person, a permit may be issued enabling the holder to purchase limited quantities. This is usually taken as not more than 100 detonators, and 10 lb of explosive at any one time. An approved type of container must be used for storage purposes.

Safety fuse usually has a black core, and burns at the rate of 2 ft per minute. It is a good practice to cut off a measured length, and test by lighting and timing before actually using in a live charge. Fuse should be cut in two ways straight across at right angles for the detonator end, and slanting along at a very acute angle for the lighting end. This presents a larger surface for lighting.

Fusing the Detonators

Commercial detonators (No. 6) are supplied in boxes of 100, they contain fulminate of mercury, and these small shining cylinders must be treated with the greatest respect. Special pliers for crimping the detonator on to the fuse can be obtained, and should be used. The practice among some quarrymen and other users of crimping with the teeth is both stupid and dangerous. Both gelignite and ammonal can be obtained in various sized sticks, the recommended sizes being either 4 oz three-quarter, or 3 oz five-eighths, the latter size referring to the diameter of the stick. In addition to the fuse, dets., and explosive, the shotsman will require twine, a common lead pencil, a small tin of grease (for wet holes), and a stick for tamping the charge, a stout broomstick is good for this. On no account should a metal rod or metal tipped stick be used. The method of preparing the charge is quite simple, the length of fuse being governed by the depth of the drilling, plus 6 in. or so for lighting. Having ascertained that there is no sawdust or cork packing left inside the detonator (if there should be, remove by blowing into it, not by probing with a pin or piece of wire), place the flat end of the fuse into the opening of the detonator and press gently but firmly right home (do not screw on), and crimp with the pliers about ½ in. down the detonator. Now take one of the cartridges of explosive, and unfold the paper at one end, with the pencil push a hole through the centre of the stick for about two-thirds of the total length, into this hole insert the detonator and fuse. Fold the paper back round the end and tie with a couple of turns of twine, for use in wet holes cover liberally with grease. It is advisable to have the holes ready drilled before making up the charges.


Cartridge with one end opened Hole pierced ready to receive detonator
Detonator crimped into fuze
Detonator and fuze in position
Paper wrapping replaced and tied with twine
Steps in preparing the charge

Whether the holes are drilled by hand or some form of mechanical equipment is immaterial, the requirements are the same, a hole 2 ft to 3 ft deep and 1½ in. in diameter will usually give the best results, but obviously as the type of rock and conditions vary it is

* Pirelli General Cable Works

difficult to lay down any hard and fast ruling.

The charge is lowered into the prepared hole, taking care not to shake the explosive off the detonator. If more than one cartridge is considered necessary, the extra sticks should be placed into the hole first, and the detonating charge placed on top. A layer of fine earth then put in and tamped firmly over the charge, then another layer and so on until the hole is full. Damp earth will pack tighter than dry for tamping, and water is considered by many experts to be the best agency for sealing off a charge.

Tamping is Important

Since, to a great extent, the efficiency of the operation depends on the tamping, care must be taken to ensure that the hole is packed solid. When using the tamping stick, avoid standing directly over the borehole with the stick pointing at the body, for obvious reasons. Although the chances of a premature detonation are few, it should be borne in mind that it could happen.

Before igniting the fuse, audible warning must be given to workers in the blasting area, that firing is about to take place, this is done either by blasts on a horn, or by whistle, and by the display of red flags. The danger of flying rocks and fragments can be minimised to a great extent by the use of bundles of sticks and chain-link fencing pegged down; naturally when cutting the lengths of fuse, extra time for dropping the faggots over the charge and pulling the chain-link into position must be allowed.

In the event of a misfire occurring, the area must be fenced off, and the charge not disturbed for some hours. The safest method of disposal then is to place a light charge close to the original and explode the misfire by sympathetic detonation.

Avoid Handlings

The operator should avoid actually handling the gelignite as much as possible, it has the property of causing violent headaches. If gelignite is found to be discoloured, usually violet or green, it is old stock and not too safe to handle, this should be disposed of by burning, a very small quantity at a time, in an open space, as it burns with a fierce flame, care should be taken to avoid other combustibles.

Avoid the use of very heavy charges, it will often be found that moderate controlled charges will be more effective.

Drilling the holes for the charges may be carried out either by hand with a jumper bit and hammer, or with pneumatic drills. The modern high speed drills of today will pierce through nine inches of hard granite a minute, and will drill from 70 ft upwards before re-grinding is necessary. Using only a hand set, the average time will be found to be about seven inches per hour, using a 1½-in. bit. Generally speaking, a "cross type" bit will be found the most useful, being less liable to jam in the hole.

CONDUCTING GLASS

INCREASING the surface conductivity of glass by depositing on it an electrically conducting film which is transparent to light is a new technique, recently developed at the National Physical Laboratory, which has many important potential applications in industry. The method used is to prepare an oxide film, laid down very evenly on the glass surface, and then to heat treat the glass to fix the film in position.

Tin gives good results when used for this treatment. It is deposited on the glass by a well-established method, and the glass is then heated to a temperature near that at which it softens. The tin oxidises and becomes transparent, and the coated glass is then allowed to cool down. The next stage is to wash the film in water and then dry it, a process which increases the surface conductivity. At the conclusion of this step, the film is hard, inseparable from the glass surface, and resistant to chemical attack.

Visibility through the glass is reduced by the metal coating in a degree which is claimed to be negligible for practical purposes. The coating has a resistance of about 1,000 ohms between opposite edges of a square. Its current-carrying capacity is sufficient to enable the prevention of ice or snow formation and misting up. When used for such purposes, the layer would be sandwiched between two plates of glass.

Ceramic materials other than glass can be treated by the process, but one further advantage of the treated glass remains to be described. When coated glass is used for the windows of electric measuring instruments, static charges can no longer accumulate when these windows are cleaned in dry weather. It was the danger of such static leading to errors in instrument readings that initiated the successful research into the coating process that has now been announced. It is understood that patent protection is being sought.

I.E.E. Television Convention

FROM April 28 until May 3 will be held one of the largest technical conventions yet held on the subject of television. This Convention, which is being sponsored by the Radio Section of the I.E.E., is being held for three main reasons. First, it was felt that the time was ripe to take stock of the position attained by television as a significant national service; second, it was desired to place on record the pioneer work undertaken in Great Britain, not only in providing the first public television service in the world, but also in being responsible for many detailed technical improvements. Lastly, it was believed that as no other country in Europe had a television service with a national coverage, the unique experience available in this country might be of use to those responsible authorities who were in process of taking the decisions which must precede the introduction of national television services.

It must be emphasised that the Convention is fundamentally technical in scope and deals purely with the technicalities of television and its associated transmission or carrier circuits. However, contrary to the usual practice of the Institution, the Convention will not be confined to members and their guests. On payment of a fee of 30s. any interested person able to profit from the papers and discussions may register for the Convention and share fully in its programme, which, in addition to the technical discussions, includes visits of technical interest and a number of social functions.

The whole field, from studio to viewer, will be covered in ten technical sessions of approximately two hours each; all will take place in the Institution lecture theatre, except that devoted to "Industrial Television," which will be held in the Great Hall of the Institution of Civil Engineers and will be conducted through the medium of large-scale television.

To the present date, some 268 registrations have already been made, and nearly 1,000 preliminary applications received, approximately 9% from overseas.

PARLIAMENT DEBATES COAL SAVING

EFFICIENT utilisation of coal was the subject chosen for discussion in the House of Commons on Private Members day last week. Mr. M. Philips Price (Glos. West) moved a motion calling attention to this matter, stressing especially the contribution the domestic user could make. Mr. Nabarro (Kidderminster), who seconded the motion, accented the industrial possibilities of saving coal. He pointed out that the most the domestic consumer could contribute was 2 to 4m tons/year. In the industrial field he gave special importance to boiler maintenance, thermal insulation, and thermostatic control. In addition to this, he advocated back-pressure generation of electric power within industry, and continued his well-known theme that the B.E.A. did not encourage this activity sufficiently.

Mr. Noel-Baker, the former Minister of Fuel, reviewed the recent Economic Commission of Europe report on fuel, and went on to emphasise that increased investment in industrial plant was bound to mean an increase in the demand for fuel. Going on to the attempt to develop a British fuel policy, he gave his reasons for setting up the Ridley committee. He advocated a low-interest loan for firms installing fuel-saving plant, but gave a warning about expecting too much from the back-pressure generation of electricity. He quoted an estimate that if it were used everywhere possible, the extra power available would amount only to 500 MW.

Mr. Geoffrey Lloyd, the present Minister, agreed with some of the speakers in the debate that it was necessary to be careful in drawing up estimates of possible fuel saving. Too often they did not take into account the enormous physical difficulties of achieving higher efficiency. He quoted railways electrification and the replacement of obsolete gas ovens by modern designs as desirable fuel saving devices that were economically impracticable. He summed up this part of the subject by quoting a fuel expert as saying that 20 to 30m tons of coal per year could be saved—in 20 to 30 years time.

He went on to reaffirm some words of Mr. Gaitskell in 1948 concerning freedom of choice and the limitation of co-ordination to the satisfaction of consumers' needs at minimum cost. Concerning back-pressure generation, he emphasised that no general rule could be laid down. The B.E.A. wished to encourage the installation of such plant, but each case had to be considered on its individual merits.

Finally, he dealt with insulation and fuel-saving equipment. This usually gave a quick return for money paid out, in terms of fuel saved, but it was realised that there were many firms which did not feel able to devote capital to this purpose. The Government were accordingly proposing to allocate a sum of £1m for loans to such firms for structural insulation or the installation of approved equipment.

Apprenticeship and After

Post-graduate Activities for the Electrical Engineer

MUCH attention has been given recently to technical education and to engineering apprenticeship. This subject is studied at its next stage in the paper read on Thursday last at an Ordinary Meeting of the Institution of Electrical Engineers. "Post-graduate Activities in Electrical Engineering" is the title adopted, and four authors, all from the British Thomson-Houston Co., combine to discuss this aspect: they are Messrs. W. J. GIBBS, D.SC., M.I.E.E., D. EDMUNDSON, B.SC., M.I.E.E., R. G. A. DIMMICK, B.SC., M.I.E.E. and G. S. C. LUCAS, O.B.E., M.I.E.E.

Right at the beginning of their paper, the authors make clear their opposition to the creation of technological universities, providing as well as more graduate engineers generally, more who already have some specialised knowledge of application. Condemnation of such an idea is based on the importance, to the authors' minds, of industrial training; on the greater benefit to all concerned of advanced study and research activity when based on industry, rather than confined within an educational institution; and on the paramount importance of maintaining the quality of engineering personnel. Increased numbers are considered as in a lower degree of importance.

The electrical industry has been increasing by about 8% per year for the last 50 years; the rate of increase of technical staff required to maintain and expand the industry is between 4 and 5% per year. To meet this need, after allowing for the requirements of other industries and attractions overseas, an annual rate of increase for universities and colleges of between 5 and 10% per year is estimated to be required.

Post-graduate Work

Ideas on post-graduate activities presented in the paper begin with the apprenticeship period, with fortnightly lectures by members of the staff of the firm concerned. These talks aim to give apprentices a broad view of the firm's activities and general trends. At the same time, evening courses at the local college of technology can be open to those who wish to keep alive their academic studies, and to extend them. Such courses must not be too wide in their range, and it is most important that students attending them must have private study and homework to do in connection with them.

Advanced engineering courses are designed on a different basis: for instance, they may deal with applied mathematics for engineering purposes. Members of such courses are expected to do between eight and ten hours of private study each week. The broad policy of the course is laid down by a committee consisting of managers of design departments with representatives of the research laboratory, the education department and the works. Further courses cover certain specialised subjects, while an advanced design course of a more practical nature acts as an alternative for some students.

Finally, in the list of courses discussed by the authors comes the short-time course in an advanced technical topic. This is usually organised by a university, the vacation schools run by Imperial College, London, providing an example of what is under consideration. Subjects discussed there have been power system analysis, new approaches to electrical machine analysis, and information theory. Courses in preparation include insulation of electrical plant and applications of communication theory. Vacation schools are a valuable activity, but the standard must be kept high, the aim being always to advance the frontiers of knowledge.

Applied engineering research is discussed in the paper, and the idea that it might be remitted to universities is strongly attacked. It is considered that unless the research work is guided in collaboration with industry's engineers, it is liable to go astray and produce a trivial or unrealistic result. The only person to benefit then is the man engaged on the work: and he could be as well off as a result of doing his research within industry.

Where suitable candidates for research are found, it is suggested that they shall spend two years in a normal apprenticeship with an industrial concern in which they will subsequently do their work. At the end of the period they can then begin their research under the joint direction of an industrial engineer and their own professor.

DISCUSSION

PROFESSOR WILLIS JACKSON (Imperial College) announced that as a result of discussions with the Institution, the authors' firm (B.T.H.) proposed to establish a number of engineering research fellowships for award to suitable graduate apprentices.

preferably at the end of the first year of apprenticeship. The fellowships would cover two years of post-apprenticeship research on engineering problems of particular long-term interest and importance to the company, and work would be supervised by an appropriate member of the company's staff. In addition, an attempt would be made to interest an authoritative member of the staff of a university in the research project and, where desirable, arrange for appropriate parts of the work to be carried out under his guidance and in his laboratory.

MR. H. WEST (Metropolitan-Vickers) spoke in approval of the scheme, and remarked that under the present system of training they were finding that some of the brighter young engineers from South Africa were being sent to America for training. This fact was tied to the complaint, sometimes voiced, that the apprenticeship system in England did not go far enough. It ended in two years and left the young man "unfinished."

PROFESSOR W. A. TUPLIN (Sheffield University) agreed with the authors' accent on the importance of the highest possible standard of personnel. He advocated a more marked financial discrimination between mediocre men and outstanding men, taking "outstanding" to apply to technical ability, and not specialisation in industrial politics.

PROFESSOR E. B. MOULLIN (Cambridge University), while agreeing that the entry of graduates into industry should not be delayed by further college courses, warned that this opinion was not held everywhere. He referred in particular to the White Paper on Higher Technological Education published last September (ELECTRICAL TIMES, September 27, 1951, page 570), which spoke very explicitly about first steps towards providing longer courses by encouraging a few universities to institute post-graduate courses of one year's duration.

MR. H. J. SHELLEY (Min. of Education) agreed that the large firms, such as that with which the authors were associated, could give excellent opportunities for post-graduate training on a co-operative basis within their own organisation. He went on to urge the authors to keep in mind the smaller industrial concerns, of which there were so many in this country. Could not the colleges do something for them on a full-time basis?

DR. E. MARSDEN (Govt. of New Zealand) urged that men selected for the special training described in the paper should be kept in research and development rather than be sent into the forces for two years. He complained that many young research men who had been sent to the U.K. for training had had the initiative knocked out of them during the period of apprenticeship. At the end of it they were of no use for progressive development work.

PROFESSOR F. M. BRUCE (R.T.C., Glasgow) suggested that the traditional methods of training the future fundamental research worker on the lines of the Ph.D. system had given considerable success in the past. He hoped that the system would be continued in the future.

MR. S. E. GOODALL (W. T. Henley's) advocated encouragement of suitable men to transfer from National Certificate courses to study for a university degree.

MR. L. H. CARR (Metropolitan-Vickers) reviewed American practice, which was to give university men at least three years' training on courses like those which were discussed in the paper. To meet the competition of that country successfully, we had to follow that example. All big British firms should set up courses like those described by the authors.

MR. A. DRAPER (College of Technology, Rugby) suggested that there might be ways in which the engineering teacher on the staff of a technical college could go back into industry to do some work and keep his experience up to date.

Mr. B. ADKINS (Imperial College) urged collaboration between universities and industry. Mutual help could forward the efficiency of both branches of activity.

MR. F. R. LIVOCK (G.E.C.) spoke of recruitment from grammar schools and public schools. He said that success was still lacking in the task of putting across the fact that a career in engineering was something worth while. It was possible that if better training were offered to technicians, fewer professional electrical engineers would be needed in industry.

After various other speakers had contributed to the discussion, MR. G. S. C. LUCAS replied briefly for the authors.

RESEARCH AT GLASGOW

RESEARCH work in progress at the Royal Technical College, Glasgow, during the session 1950-51, is reviewed in "Research Report," a College publication which was sent us recently. It is noted that the major research activities of the Department of Electrical Engineering are in the field of high-voltage engineering, with attention to associated arc problems. In addition, work is starting on a specialised problem in electronics, namely, the stabilisation of oscillators by molecular resonance.

To extend the facilities for high-voltage work, a special laboratory is being provided, with suitable ante-rooms and equipment for working at voltages up to 1,500 kV. An impulse generator is due soon, and a cascade transformer set for 600 kV is also planned. Much of the work being carried out is concerned with the design and construction of high-voltage equipment and associated measuring apparatus. In this connection, however, an investigation of the conditions which determine whether or not a power arc will follow an impulse flash-over is of immediate practical importance.

Amongst items of work in other departments, we note especially the hydraulic model investigations being undertaken for the North of Scotland Hydro-Electric Board (Cowal and Shira Schemes).

Heating of Churches

Electrical Methods advantageous for Intermittent Load

ELECTRICAL methods of church heating are examined in some detail in a "Symposium on Church Heating," by Messrs. J. R. Harrison, B.SC.(ENG.), A.C.G.I., E. M. Ackery, A.F.C., B.SC., and D. R. Wills, B.SC., A.C.G.I., which was presented to the Institution of Heating and Ventilating Engineers on Thursday last. Electric heating should, in the authors' opinion, be considered as a method of heating rather than as a particular fuel. The way in which electric heat is applied to the church is of vital importance, and in the cases which undoubtedly do exist where satisfaction is not being obtained, it is essentially the particular method of application that is at fault.

To provide information on the practical value of electric heating, a survey was conducted of some 87 churches throughout the country where electric heating was installed. Electrical church heating may be merely a variant of hot air or hot-water radiator heating, but in the main this method does not make full use of the flexibility of application of the former method. The alternative attack is to endeavour to provide comfort for the individual rather than to heat the whole building. In this respect it is important to realise how intermittent church heating is: the actual time per week for which heating is required is very small

Electrical Loading

One firm of experienced electric heating engineers is known to make a practice of calculating the required loading for a church on a basis of 16 to 17 W/sq ft of floor area. Checking with a number of churches whose heat requirements were calculated on a more rational basis, good correlation between floor area and heat requirements was obtained. Exceptions were cases where the church was unusually tall for its breadth. The floor area taken is that of nave, chancel, aisles, etc., and of the tower and vestry.

As a result of the survey, and a consideration of incumbents' opinions on the efficacy of their heating systems, it is suggested that a loading of under 10 W/sq ft will be unsatisfactory; from 10 to 15 W/sq ft fair to satisfactory; and above 15 W/sq ft satisfactory. The placing of the heaters is, however, of considerable importance.

Tubular heaters, loaded at 60 W/ft run are by far the most popular form of electric heaters for church use. Electric convectors, unit heaters and radiators have applications. Heating panels are seldom used, but electric fires, though not often used for heating the entire church, are frequently used to back up other types of heater. Examples of churches where all these methods are in use, alone or in combination, are discussed at considerable length in the paper. In general, where the installed loading is satisfactory within the limits suggested, lack of satisfaction is due to draughts.

Tubular Heaters

A length of tubular heating in each pew, including choir stalls, does not itself give an adequate loading. The remainder of the required loading, after making provision for the chancel, should be used where it will be most effective in preventing draughts, especially down-draughts from clerestory windows, lofty roofs, and walls.

When the electricity consumption of the various installations is analysed, it becomes obvious that a low loading does not necessarily lead to a low consumption of electricity. Prolonged heating-up periods may be misguidedly tried as a means of improving comfort. Overall, figures for consumption vary widely, averaging 1 kWh/year/sq ft floor area/weekly service hour; in any particular case it may vary from 0·5 to 1·5 kWh. The "personal comfort" type of installation is more economical than the central heating type in this respect.

Automatic control by thermostat is in general an unnecessary expense and complication in a church heating installation. The installation of a time switch on the other hand, might well be considered, as this can be arranged to switch on the installation at some given time before morning service, and can also be used to ensure that heating is switched off towards the end of the service. The risk of unnecessary consumption perhaps some days due to the omission of manual switching off, may be thus avoided.

Advantages of tubular heaters in the pews have already been mentioned; care must be taken, however, that they do not interfere with kneeling. A position in front of the occupants of the pews is on the whole preferred, as a tubular heater gives off a good deal of radiant heat, and in the front-mounted position this is used in the most effective way.

Direct Current Transmission

E.R.A. SUGGESTIONS FOR THE NEXT STEP

FUTURE development of high voltage direct current transmission in this country is suggested in a report, dated January of this year, which has recently been published by the Electrical Research Association. In a general review of the situation at the present date it is stated that where overhead lines are feasible, d.c. becomes economically competitive with a.c. for distances over 300 to 400 miles. Where overhead lines are not an acceptable solution, the minimum distance becomes 25 miles.

Principal item in the research and development programme required, relates to the development of the convertor equipment and the necessary valves. The nearest approach to the required type of valve which is made in this country at present has a rating of about 50 amp at 17 kV. For commercial possibilities a minimum rating of some 500-650 amp at 60 to 80 kV may be required. The principles underlying the design of such valves are known but they differ in some important respects from those used in the available designs.

The majority of other apparatus developments required consist essentially of the extension of well established fields of electrical engineering, d.c. circuit-breakers being an exception. Such features as corona losses, insulation levels, telephone and radio interference, which have been investigated for alternating currents, have still to be explored for d.c. applications.

Problems concerned with operation control and protection can be studied initially mathematically and on a small model. Later on, of course, experience will have to be gained on a full size convertor station.

Research Organisation

It is suggested in the report that the development of apparatus will for the most part have to be handled by manufacturers. The ultimate aim is to provide d.c. plant of a size such that it becomes economically superior to a.c. plant, and equal to it in reliability. Development to this point must be performed in stages, but cases will arise where d.c. has to be used for technical reasons : undersea cables and trans-desert schemes provide examples. Such projects offer an ideal opportunity of studying d.c. problems at intermediate powers and voltages, with a chance of eventual profit.

Proposed electricity schemes involving long-distance transmission, with cost of d.c. solution

No.	Country	Line	Power MW.	Total dist. miles	Cable miles	Cirs.	Min. volt. kV.	Cur. p. circuit amp.	Prices millions of pounds			
									O.H. line	For cable	Stations	Total
1	Gt. Britain	Midlands-London	750	150	150	3	300	625	—	7·7	11·25	18·95*
2		North-South	300	600	—	3	360	280	7·2	—	4·5	11·7
3	Norway	Mid Norway-Denmark	300	300	85	3	254	395	2·1	3·4	4·5	10·0
4	Sweden	Lapland (Lule R.)-Mid-Sweden	500	600	—	3	360	465	8·4	—	7·5	15·9
5	Egypt	Asswan-Cairo	240	480	—	3	360	220	5·7	—	3·6	9·3
6		Wadi Halfa-Cairo	200	670	—	2	360	280	5·4	—	3·0	8·4
7	Sudan	Nimule-Malakal	100	400	400	2	300	167	—	9·5	1·5	11·0
8	S. Africa	Kariba Gorge-Rand	400	600	—	3	360	370	7·8	—	6·0	13·8
9	India	Teesta-Calcutta	800	330	—	5	254	630	5·9	—	12·0	17·9
10		Brahmaputra-Calcutta	1,000	700	—	5	360	550	18·2	—	15·0	33·2
11		Bhakra-Delhi	600	250	—	4	254	590	3·2	—	9·0	12·2*
12		Backbone lines Calcutta U.P. for interchange Bombay-between industrial area Nagpur	400	600	—	3	360	370	7·8	—	6·0	13·8
13			240	400	—	3	254	320	3·7	—	3·6	7·3
14	Australia	Tasmania-Melbourne	400	362	117	3	254	525	2·7	5·0	6·0	13·7
15		Snowy R.-Sydney	500	280	—	3	254	650	2·8	—	7·5	10·3*
		Milford Sd.-East Coast	500	250	—	3	254	650	2·5	—	7·5	10*
16	New	S. Island, N. Island, across										
17	Zealand	Cook St. by cable	500	300	25	3	254	650	3·0	1·0	7·5	11·5
18	Canada	Des Joachims	200	200	—	3	254	260	1·6	—	3·0	4·6*
19		St. Lawrence	350	250	—	3	254	460	2·3	—	5·25	7·55*
20	Argentine	Salto Grande-Buenos Aires	420	500	—	3	360	390	6·5	—	6·3	12·8
		Total for all schemes	8,700						96·8	26·6	130·5	253·9
		*Total for schemes less than 300 miles	2,900						12·4	7·7	43·5	63·6
		Total for schemes of 300 miles and upward	5,800						84·4	18·9	87·0	190·30

Note.—All prices are given on a basis of costs in 1947

To give Britain a chance of sharing in this work, a trial plant should be erected using mercury arc convertors similar to designs already available for other purposes, and used to transmit power over an existing transmission line to gain operating experience. Such a plant could be in operation in seven to eight years time, on a load of the order of 20 MW at 200 kV. It should preferably be a link between two points on a large alternating current system which could supply the wattless requirements of a direct current conversion system.

Such a plant would permit the study under service conditions of such details as the commutation process, the influence of transformer self-capacitance, damping of oscillation, in the transmission system and transformer windings, communication interference, etc. The development of large convertors would be part of the programme undertaken, but as already stated, a start could be made at lower power with designs that are at present available.

ELECTRICAL STREET HEATING—

American and Swiss Experiments

ALTHOUGH the British winter is seldom so severe as to cause serious inconvenience to traffic in large towns, other countries abroad are faced with the annual problem of maintaining the flow of urban vehicles and pedestrian traffic in conditions of snow and frost.

The recent experiments using electrical heating of roadways and pavements are therefore of interest. In America, the Michigan State Highway Department, in co-operation with the Detroit Public Lighting Commission, have been experimenting with electrically heated strips of highway one block long on Eight Mile Road, to rid the surface of snow as fast as it falls. This experiment was carried out to test the feasibility of applying the system to the Edsel Ford and John C. Lodge expressways which are now under construction. Electrical grids are buried some two inches below the road surface and thermostatic control is incorporated which will turn on the current as the ambient temperature falls leading to snow or ice conditions.

Through two mild winters the system proved satisfactory, but last winter the system proved inadequate to clear a 17 in. snowfall. On the strength of this experience it was considered inadvisable and uneconomic to use the system on the expressway ramps as originally suggested.

Despite the unfavourable decision made by the American authorities, experiments using the same technique are proceeding in Switzerland. In this case the pavements and not the road surface are being dealt with. The original installation at Zurich consists of ordinary wire netting laid down about 2-3 cms below the pavement. This is loaded to give a temperature high enough to prevent snow lying for any length of time. The originators of the method, Messrs. HS. Von Gunten of Zurich, also claim that the system is suitable for inside rooms and spaces such as garages and churches where stone floors are available. To give an inside temperature of about 20° C., a loading of between 50 and 100 watts is sufficient. As the system is not yet patented in this country, the makers are not willing to release further information, but would like to get in touch with any interested organisation with a view to exploiting it in this country. Their full address is HS. von Gunten, Volksbank VIII 359, Minervastrasse 40, Zurich 7/32.

The accompanying picture, taken in Zurich, shows the efficacy of the pavement heating in contrast with the snow-covered roadway

SAVE SHEFFIELD'S TRAMS!

OPPOSITION by the Sheffield Tramways Development Association to a decision taken by the Sheffield City Council to scrap the trams, has resulted in the submission of a petition to the Government. This petition was accompanied by a report to the Minister of Transport, explaining in detail the reasons for opposing the Council's action.

It is pointed out that the report of the general manager on a scheme of tramway replacement as submitted to the chairman and members of the General Sub-committee of the Transport Committee stated that there was a decline in the numbers of tramcar passengers carried in 1950 as against 1947. This was due to an increase in the number of buses, a decline in the number of trams, an increase in bus routes with no equivalent increase in tram routes and the establishment of new housing estates served by buses. In actual fact there was also a decline of bus passengers carried in the same period. Thus, the petitioners claim, there is no justification for quoting the decline in passenger traffic on trams as a sign of unpopularity.

The petitioners emphasise that the loan periods of 15 years for tramcars and 10 years for motor buses show a preference in favour of buses, but as 10-year loans for buses are unknown, eight years should be taken. With trams, however, up to 25 were not impossible and on this basis the trams were economic.

Repair and tyre costs in respect of motor buses had been taken at 3·582d./mile while the comparable figure for trams was given at 3·8216d./mile. These figures, they claim, are not strictly comparable as they were based on a comparatively new bus fleet and an old tram fleet. Further, the tram tracks and rolling stock were in a bad state due to neglect during the war years. The replacement programme scheduled to begin in 1944 should have been put in hand. The reasons for holding this over had been stated to be lack of labour and finance. But these had not prevented the wholesale purchase of buses, nor had it stopped work in other towns. The report contains suggestions for the re-routing of trams, replacement and reconditioning and acceleration of services.

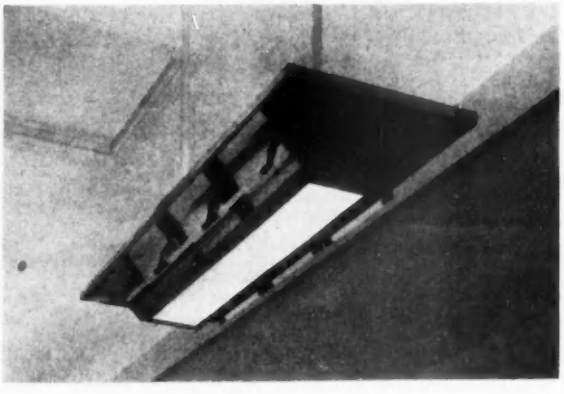
Combined Lighting and Heating

WE have received from the Midlands Electricity Board the accompanying illustration of an experimental combined unit for providing indirect lighting and radiant heat.

It is claimed that this design is particularly suitable for halls or rooms not continuously occupied, and which may be required at short notice, because the full reflected heat is available in a few seconds. A much smaller unit has been designed for using in small rooms, and where such a unit is appropriate it should save considerable expense on the installation, since in these days of tariffs covering electricity supplied for all purposes only one circuit is needed from a switch at the door to the lighting/heating fitting, the heater being separately switched by a switch on the fitting itself or a cord operated ceiling switch.

The lights can be switched on without the heat, but the heat cannot be switched on without the light—if the heater is wanted, the heat coming from the lamps may just as well be made available. The psychological effect of the warm-looking indirect lighting adds to the comfort of the room.

The light under-side of the fitting is ripple glass, and this is not intended to provide the main lighting, which comes via the ceiling from "Silverlite" lamps on the top of the fitting. Fluorescent lamps are not considered necessary in rooms not regularly occupied, because in the winter, for example, if lighting is required it is highly probable that heat is also required, and the heat from the tungsten filament lamps is not wasted.



Attractiveness as well as utility is shown in this combined lighting and heating appliance

Problems and Practice
IN ENGINEERING

In Case of Trouble

THERE are certain machines with fairly complicated electric control circuits where any fault, however minor in nature, is serious in consequences. In such cases it is imperative that, pending the arrival of a skilled tradesman, the machine attendant does exactly the right thing. For example, take a fully automatic oil-fired boiler which is supplying steam for process work where any interruption would be costly in spoilage. Here, quite a number of simple troubles can develop and cause failure of the flame. Such faults might be in controller contacts, heaters, light-sensitive equipment, pressure switches, water level switches, sequence operating devices and of course electricity supply, apart from purely mechanical faults.

If the attendant knows what to do he can remedy the matter himself, so a limited training can be given to any reasonably intelligent operator. These limits should be clearly defined so that he will not experiment rashly and aggravate the situation. In the event of his being unable to re-establish the flame he should know which steam loads can be safely shut down so that the diminishing quantity of steam can be conserved for essential purposes.

This training should take the form of emergency drill and at fairly regular intervals the plant engineer should check the procedure by arranging mock faults. There should also be fixed in a prominent position a plainly worded summary of what the attendant is expected to do should trouble develop. The advice, so often repeated in first-aid manuals, "send for the doctor," should not be forgotten.

Naturally, it is unnecessary, and indeed unwise, to insist on such a procedure where a stoppage is relatively unimportant. In many instances, however, a quite absurd amount of time and material is lost when with a trifling outlay in money and energy it could be avoided.

In important installations, too, any simple aids to "trouble-shooting" are of considerable assistance. A neon lamp makes a cheap and reliable tell-tale. A scrap of the correct size of fuse wire can be left inside the controller. Test-points can be made reasonably accessible. A circuit diagram can be mounted on the panel.

In the boiler installation already mentioned, the light-sensitive unit might be cut-out by a suitable switch and adjustments made while the machine is in motion. This may appear to be carrying caution to an absurd length, but it is an undoubted virtue of electric control that emergency alternatives are readily possible and not unduly expensive.—*W.H.A.*

Turbo-Alternator Couplings

COUPLINGS for turbo-alternators are designed so that they are capable of transmitting large powers at high speeds, and, in addition, provide a considerable measure of flexibility.

The steam rotors of multi-cylinder turbines are connected together by means of a coupling of either the solid or flexible type, depending on the design of the turbine. Couplings of the double flexible type in which each shaft end has a toothed claw mounted on it, the two claws being connected by a sleeve, are made so that the sleeve has an extremely small radial clearance on each claw.

In one installation the author knows a fairly large amount of wear took place between the claw faces after a number of years' service. The wear took place on the working or drawing faces of the claw and sleeve resulting in the formation of steps or imprints of the claw teeth on the sleeve, thus preventing axial movement of the alternator rotor towards the turbine. To reduce this wear brass pads with suitable oil grooves were fitted on the sleeve claws and this appears to have overcome the trouble.

If for any reason it is found that the coupling claw moves out of the centre due to a large radial clearance and steam is admitted to the turbine (so that the shafts accelerate continuously) then the driving force may be sufficient to lock the coupling sleeve out of centre and a slight unbalance will result. A radial clearance of not more than 0·005 in. on diameter has been found satisfactory, adequate flexibility being maintained.—*M.Inst.C.E.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Problems of a practical nature to which a solution is required will also be considered. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

A Village of IDEAL HOMES

Central Feature of this year's Exhibition at Olympia, shows Electricity properly at home

PROMINENT feature of the post war years was the trend towards planning the community as a living unit as opposed to the traditional idea of an Englishman's home being his castle.

This theme is apparent in the *Daily Mail* Ideal Home Exhibition which is occupying Olympia, London, from March 4-29. For the main feature is a village of ideal homes complete with "local" and shops set round the centuries' old Cross of Meriden, said to mark the centre of England and brought from the Warwickshire village specially for the occasion.

Spring time usually makes housewives more home-conscious, and the model homes being fitted and furnished to display latest ideas in home comfort are a great source of attraction. Consequently it is pleasing to note that the interior decorators and furnishers have not forgotten the great advantages of electricity in making a home clean, comfortable and convenient.

Ventilators, air conditioning, refrigerators, cookers, radio receivers, water heating and fires, vacuum cleaners, etc., by electricity, are included and credit must go to such firms as Fenton Byrn and Co. Ltd., J. H. Walter Ltd. (also for the "No-cord" iron), Electrolux Ltd., Hurseal Ltd., H.M.V., and of course Electra (Birmingham 1935) Ltd, and Hailey Installation Ltd., for the installation work which incorporated fittings and accessories by Clang Ltd.

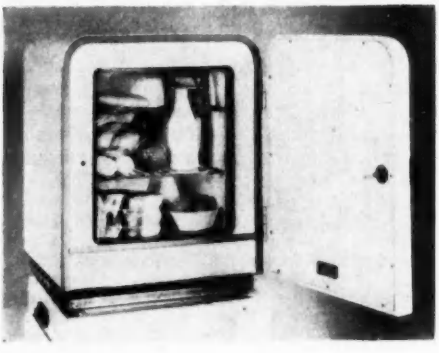
We note particularly the People's house with an electric cooker and the Old People's house with an electric fire in the bedroom whilst both incorporate immersion heaters in the water systems.

In the village shops, Hoover Ltd. have successfully drawn public attention to their new floor polisher, the vacuum cleaners and their famous washing machine, whilst in another shop, Morphy Richards have a comprehensive display of domestic appliances including the latest "Atlantic" lightweight heat-controlled iron on show for the first time. R.T.R.A. are occupying the village radio and electrical shop to the great advantage of the trade.

The stands of electrical manufacturers are to be found in every section, so that wherever the visitor walks a display is on hand.

Morphy Richards make a feature of their stylish "Atlantic" iron

Newcomer to the show is this new "Alaska" absorption-type baby "frig"



Perhaps most important electrical asset from the psychological angle is electric lighting, and indeed the displays of manufacturers are attractive. Displays of fittings include those of Linolite Ltd., with a new two, three or four lamp ceiling fitting; British Electric Lamps Ltd., alongside with displays of tubular filament and candle lamps of various patterns. Gleco Fittings, Philip Shaw (Contractors) Ltd, Falcon Forge Ltd, and Lustro Distributors all have displays which will grace any home.

Housework carried out efficiently makes for ideal homes, and there are few housewives who are not aware of the great assistance that electricity renders in doing away with drudgery, so our readers will not be surprised to hear that the displays of Hoover Ltd., English Electric, Electrolux, Vactric, Jifextra, Bendix, Tellus,

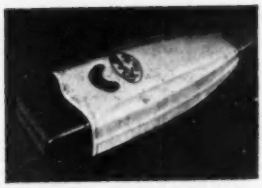
H. Fisher, Thor Appliances, B.V.C. Goblin Servis (Wilkins and Mitchell) Ltd., and Bylock Ltd. are crowded with interested women folk. For cleaning and laundry work have long been the province of the backache "gremlin," but not now, judging from the displays of vacuum cleaners, floor polishers, washing machines, and electric irons. Incidentally the supply of constant hot water is ensured by the equipment of H. Fisher (Oldham) Ltd., and Rodway Jones and Co. and others.

New methods are always an attraction, so the ironing demonstrations provided by Aircraft and General Engineering Co., makers of the "Oprim" rotary iron, will continue to be well attended. Clothes drying in the small home is a problem to some, but not to fortunate owners of the Belling Fisher and J. H. Walter drying cabinets which are displayed.

The kitchen is the most essentially feminine province, and cooker and food preparation machinery makers have not lost their opportunity to display their wares to the appropriate audience! English Electric cookers hot-plates Jackson's cookers and hot cupboards and Belling's streamline cooker with glass inner door are interesting exhibits in this field. A Jackson cooker is used in the Ministry of Food display. Kenwood Electrics have made a particular feature of the Kenwood Chef with its new associated kitchen cabinet, but also show the "Kenmix," their turnover toaster and a heat-controlled iron. The "Cheeto" mixer of John Perry (Plastics) Ltd., is displayed on the company's stand.

The "Thermakozy," which was featured in these columns recently, is displayed by Battenburg and Co. This electric cosy helps keep the pot always ready for a welcome cup of tea.

The storage of food is a matter which can be handled adequately by the range of refrigeration equipment displayed by Frigidaire, Electrolux, Astral Equipment. English Electric, Prestcold, who have their new L.51 model of 5·1 cu. ft displayed for the first time in public, and the Alaska Trading Co. who have entered this market with a new range of "baby" absorption type models.



Rabaldo's Dual Ras can be tested at the self-shave booth

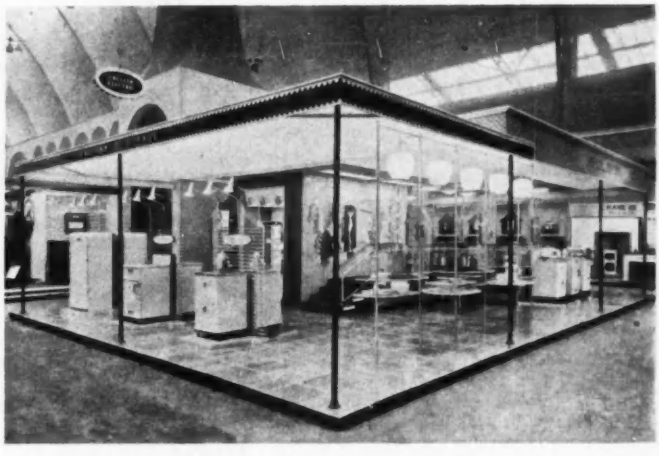
Home heating by electricity is exemplified by the graceful units displayed by Dimplex Ltd. and Hurseal Ltd. These are oil-filled heat-retaining radiators which are very efficient. Belling and Co. and English Electric have attractive radiant fires featured in their displays.

Remington Rand and Chilton Products Ltd. (BUK) have attractive young ladies to lure the unsuspecting male into the dry-shaver trial booths. John A. Fransen, who have just released two new models, the Multi Ras and the Dual Ras, also have a free trial shave display.

Relaxation in the ideal home will naturally be more of a feature of daily life than before. Should it be gardening, the displays of A.M.I. Lawnmowers, Power Specialities, and Nutt Engineering Co. should be seen, for these power-operated lawnmowers avoid backaches.

This relaxation need not be disturbed by worrying about the infant, for a new item displayed by Premier Radio is the Baby Alarm, which relays by radio the sound of crying.

Summing up all the advantages of electricity as the perfect servant is the display of E.D.A., which offers comfortable seats to the footweary, whilst a rotating display shows through television-screen type windows how power in the home makes life easier.



Typical of the many attractive stands, English Electric's display features their latest 76A refrigerator, seen on the extreme left

Fluorescent fittings as desired

New Danish system involves the use of a standard kit of parts from which many different designs can be constructed

CREDIT for the introduction of an interesting system of fluorescent lighting is attributed to the firm of Louis Poulsen and Co., Nyhavn, Denmark, in conjunction with the architects Mogens Voltelen, M.A.A., and Emil Giersing.

Flexibility and simplicity are the two most apparent advantages of this system which comprises basically a range of standard interchangeable component parts. With the aid of only one tool—a screwdriver—a wide variety of different shapes and sizes can be constructed.

Breaking down the system into two major divisions for ease of description we have the frames and the shade sections.

Frames

The frames in which the control gear and lamps are mounted can be built side by side into two-tube, three-tube, four-tube, in fact any desired practical number of tubes. They can also be joined end to end to make "line" lighting again with single or multiple lamp banks.

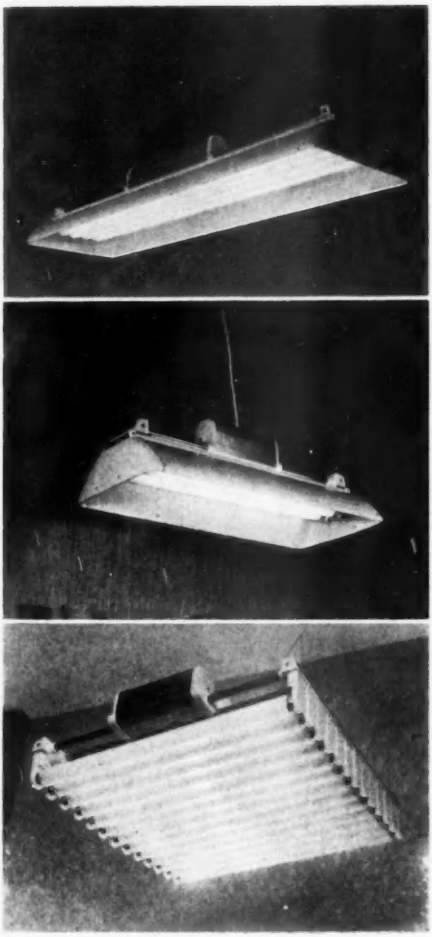
The method of suspension can be ceiling mounting, chain or wire pendant suspension or wall fixing for any of the combinations of components.

Shades

The reflectors and shades in keeping with the theme of the system are again made up from a series of components which can be built into or removed from the frames without the necessity of dismantling or removing the lamps and lighting gear.

Metal reflectors comprising parabolic aluminium or steel sections, either polished or enamelled white, linked with a horizontal centre section coupled to moulded plastic end sections, and which can be arranged for angle mounting in shop windows, are at present available along with a glass trough fitting which with slight adjustments gives different values of upward and downward lighting. Two plastic fixtures, louvre screens and diffusing glasses are in preparation.

Cleaning is made easy by the method of suspension. At each end, the trough reflector is supported by a double spring lock attachment. Either end can be released allowing the trough to swing downwards; during these operations the lamps need not be removed or the whole fitting taken out of circuit thus permitting the maintenance fitter to see clearly any dust or dirt to be removed.



In these illustrations the same basic component parts are used to create four tube, two tube and thirteen tube fittings. Fluorescent lamps of the standard sizes are used in this system

SOUTH AUSTRALIA LOOKS AHEAD

Increasing Load means More Plant Wanted

AN increase of 27% in energy sold is recorded in the report of the Electricity Trust for South Australia for the year ended June 30 last, yet that year was the first since the inception of the Trust that no restrictions were imposed due to fuel shortages. This was largely due to additional use of Leigh Creek coal, and to the commissioning of No. 4 boiler at Osborne "B" power house (adding an effective 15 MW of generating capacity) coupled with heavy and continuous week-end maintenance of plant. The year's working of the electricity undertaking resulted in a revenue surplus of £5,813 from a total revenue of £4,238,279. But the accounts of the Leigh Creek Coal Fund show a deficit of £1,739, after allowing for a grant of £200,000 by the State Government.

Domestic Increase

Of the total of 463·6 million units sold during the twelve months, 206 millions were for industrial purposes, 68 millions for commercial, and 180·2 millions for residential. The number of consumers connected increased by 10,463, of which 8,677 were new ones, while 1,786 were supplied by undertakings purchased by the Trust. In all there were 154,959 consumers at June 30, of which 133,730 were residential. Thus the average annual consumption per consumer amounted to 1,341 units, compared with 1,170 in the previous year.

The strong demand for all types of hire appliances continued, and during the year 4,724 electric cookers, 3,035 sink water heaters, 1,794 washboilers and 1,930 bath water heaters were connected up. These bring the total of such appliances in use at June 30 last to 28,752 cookers, 22,404 sink water heaters, 8,971 washboilers and 8,185 bath heaters. We also note that an Electrical Goods Approval Committee examined 70 articles during the year, of which only 23 were approved, 17 being rejected and 30 were deferred pending modification.

On the generation side, the Osborne "B" power station building has been extended to house additional plant, much of which is now being installed, and work on the site of the Port Augusta station is well advanced. The construction of a new power station at Port Lincoln, to contain ultimately both diesel and steam-driven generating plant has been commenced. In all, the Electricity Trust operates ten country power stations, which during the year generated 13·5 million units. To this must be added the 549·6 million units generated at the Osborne stations, making a total of 563 millions. Fuel costs at £1,589,588 were £446,074 (39%) higher than for the previous year, for during the period the average cost of N.S.W. and subsidised imported coal combined increased by 10s 9d per ton.

We earlier reported suggestions for the establishment of a second Port Augusta station, and an investigation has also been made to determine whether it would be reasonable to construct a further power station in the south east to burn hogged fuel from a proposed new timber mill. Believing that such a station could provide steam and electricity for the mill and other consumers in the area, the Trust are continuing negotiations with the Woods and Forests Department.

A report of the Department of Mines on coal deposits at Moorlands also raises the possibility of establishing a station in that area, and investigations are proceeding, suitable sites having been examined.

Reference is also made in the report to the vastly improved position in regard to steel supplies resulting from the visit to England and the Continent in 1950 of Mr. R. H. M. Lea, general manager and chief engineer. Work on the construction of the 132 kV line from Adelaide to Port Augusta is well advanced, and part of the line is temporarily operating at 33 kV. Altogether some 86 route miles of 132 kV line, 53 miles of 66 kV line and 33½ miles of 33 kV line were erected in the year. The conversion of the metropolitan transmission system from 33 kV to 66 kV (for which it was designed) has been started, and two of the main lines have been re-insulated. Because of the rapid growth of load in the metropolitan area, this conversion will be carried out as quickly as possible.

Coffer dam under construction at Port Augusta station site

overseas news

Transformer Order

Because one firm could manufacture in Brisbane six transformers at a cost of £75,974, the City Council has rejected a lower tender by an English firm at £74,370. The successful tenderer is the English Electric Co. Ltd., which has offered to start manufacture at an early date at Rocklea. The lowest tenderer was the British General Electric Co. Pty. Ltd. The Lord Mayor, Sir John Chandler, said that it had been the council's policy since his administration took office to give some preference to local manufacture. The Council's Stores Board reported that 14 tenders had been received from overseas and Australia, but there had been doubt whether the transformers could be imported duty free. Sir John told the council that, where it was possible for Australian manufacture, it was not usual for Continental goods to be allowed entry duty free.

Good Buildings Only

Concerned at the types of dwellings which have been given a supply of electricity, Mildura City Council, Victoria, has decided that in future only buildings which complied with the building regulations would be connected up. It was pointed out that primitive shacks along the banks of the River Murray at Mildura had recently had electricity installed despite the council's earlier efforts to have such dwellings demolished, and having an electricity supply would only encourage people to continue to live in such places, of course.

Ontario's Future

By the end of this year the Hydro-Electric Power Commission will be using a tremendous amount of high cost power—steam power. This will continue into 1953 at an increased rate, Mr. R. H. Saunders, chairman of the Commission, told 1,300 delegates to the Ontario Municipal Electrical Utilities and Ontario Municipal Electrical Association Convention, a few days ago. As a result he could not promise that the Commission would be able to maintain the present interim rates when forced to use steam power, he added. Up to now, he explained, the Commission was using steam power from only two stations, Toronto and Windsor. If, as anticipated, the load continued to grow, these plants would be required on a high load factor basis and that would be expensive. It may be, he said, a forerunner to what will happen in the province after 1956, if they were not allowed to go ahead with the St. Lawrence development. One day recently they used 426 tons of coal at Toronto just on peaks, at a cost for this coal alone of $3,625, he pointed out.

Conversion

Up to the end of 1951 a total of 178,400 consumers had had their electrical equipment converted for operation at 60 c/s, Mr. R. H. Saunders, chairman of the Hydro-Electric Power Commission of Ontario, stated recently. Three of the large areas which form part of the "25-cycle island" had been completed, he said, but one of the major difficulties encountered by the Commission was the growth in load on the 25-cycle system; a growth which at one time almost threatened to equal the pace of standardisation. In an effort to overcome this problem the Commission last year made 60-cycle facilities available for most new loads and any increase in existing loads, particularly industrial, in municipalities awaiting changeover.

Farmers' Suggestion

The Farmers Union of Alberta and the Alberta Federation of Agriculture has requested the Government of Alberta to develop electric power as a public utility under the Alberta Power Commission rather than by private companies as at present.

New Line

The British Columbia Power Commission is to construct a 60 kV transmission line from Naarimo to Parksville at a total cost of $400,000. Approval for the work has been given by order-in-council. The job will be completed by the end of this year's construction season, Mr. S. R. Weston, commission chairman, has said. The new line will replace the present 22 kV line and will take care of the fast-growing load in the Parksville-Qualicum area.

Inadequate Wiring?

Most Canadian homes are usually regarded as being voracious consumers of electricity, but we have a report of Mr. D. S. Catton, manager of the Canadian Adequate Wiring Bureau, telling members of the Western Zone of the Canadian Electrical Association that many of the homes wired today will be electrically obsolete in 10 or 15 years. Mr. Catton pointed out that the electrical industry in Canada is growing so rapidly that it will only be a matter of time until people think in terms of the all-electric home. The electric kitchen is already a reality, he pointed out, and many progressive builders are installing such kitchens in new homes prior to the sale, including the cost of the electrical equipment in the over-all end price. After referring to the big job of re-education to be done, he stressed that there was little point to their great enthusiasm for the vast hydro potential, on the one hand, if they did not raise their sights in the residential wiring field on the other.

Windmill Power

The more extensive use of windmills was one of the main subjects discussed at the annual meeting of the Dutch Windmills Association recently we gather. There are now only 1,199 windmills in the Netherlands, for 8,885 others have disappeared. The windmills are used to generate electricity, it was stated, and during periods of calm the millers had recourse to the public supply mains, but they found the latter more expensive, of course. Windmills are an historical feature of the Netherlands landscape, and one purpose of the Association is to find ways and means of ensuring the continuance of that connection. Such progress has been made that the future for the remaining windmills is less gloomy than it was, it is reported.

Yugoslav Station

The first 28,000 kW unit has recently been installed at a new hydro-electric power station at Vinodol, near the Croatian coast. The machine goes into full operation shortly when the initial tests have been completed. Total expenditure on the Vinodol power station has been placed at 1,350 million dinars. Some months hence a second and a third unit will go into operation. The turbines, transformers and other equipment for the second unit have already arrived from Switzerland.

Protection

A Bill seeking to grant protection to a number of industries, including that of brass electric lampholders, has been introduced in the Indian Parliament by the Minister of Commerce and Industry. The Bill also seeks to extend protection to certain other industries, including dry batteries and batteries for motor vehicles.

Bulk Charges Argument

Since January of last year, Port Elizabeth Council has sought to impose increases in charges for its bulk supply to Uitenhage, but the representatives of the latter town have steadfastly opposed the efforts. There is news now that Uitenhage has offered to compromise with the Port Elizabeth City Council over the matter.

Tekapo Progress

Literally with one eye on the rising water level and the other on their jobs, employees of the New Zealand Ministry of Works on the Tekapo hydro-electric undertaking have completed the first part of the big dam which will ultimately increase the water storage for South Island power supply. The work is part of a scheme eventually to produce about 800,000 kW from a group of power stations in the Waitaki Basin. The 25,000 kW generator for the Tekapo scheme, of course, is already in use. The work still to be done is aimed solely at building up storage, one of the main necessities being control gates to regulate the flow of water. Work on the Pukaki undertaking is nearing completion, the control gates there being already in position. The generating facilities are being fully used, but the flow off the watershed has been such that surplus water is still going over the top of the dam. In the meantime, the generating station at Highbank, fed by the diversion race from the Rangitata River, has been put out of action to permit scheduled maintenance. It is expected to be shortly operating again.

West Indies Co-Op Society

Following the recent formation of the Soesdyke Electricity Supply Co-operative Society, Ltd., the latter has been pressing forward its proposal to purchase electricity in bulk from a nearby generating station and distribute it to its members. Members of the Society reside in the villages of Soesdyke and Coverden, which are bounded on the west by the Demerara River. All technical and legal details have now been cleared and the Society will give notice (in accordance with the Electric Lighting Ordinance, Chapter 78) that it has applied to the Governor-in-Council for a licence to undertake this supply.

Progress in North Borneo

In the promotion of an All North Borneo Electricity Scheme, the local government has already purchased the electricity undertakings at Jesselton and Labuan. Negotiations have also taken place between the North Borneo Government and representatives of the Sandakan Light and Power Co. (1922) Ltd. for the acquisition of the latter undertaking, but at the present time there seems no progress to report. At the recent annual meeting of that company Major S. M. Churn, chairman, stated that the local government desired to co-ordinate the electricity supply facilities throughout North Borneo to cover all the towns and larger villages. At one time the Colonial Development Corporation were invited to take up a concession, but only considered the scheme in regard to the development of such places as Labuan, Jesselton and Tawau, and subsequently dropped the proposal. The local government has thereupon decided to run its own electricity facilities.

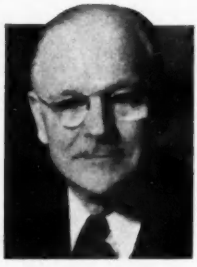
Philippines Development

The United States Export-Import Bank has announced a 20 million-dollar loan to expand electric power facilities in the Philippines. The loan would assist the National Power Corporation of the Philippines in a development project at Ambuklao on the Agno River, with generating plant of 75,000 kW capacity, it is stated. Representatives of the Bank visited the Philippines last year and inspected the site of the proposed dam on the Agno River. In addition to serving the growing demand in the Manila area, the plant will provide power for the mines at Baguio.

PERSONALITIES

IN THE INDUSTRY

Just elected a director of the Siemens and General Electric Railway Signal Co. Ltd., is **Mr. F. L. Castle,** A.M.I.E.E., M.I.S.R.E., M.INST.T., general manager of that company. He first served with the Midland Railway before joining the G.E.C. in 1919 to create a Railway Signal Department of which he became manager in 1922. On the formation of the Siemens and General Electric Railway Signal Co. Ltd., he was appointed that company's general manager. Mr. Castle is chairman of the Railway Brakes and Signals Industrial and Export Group,and has made many business journeys overseas. He was largely instrumental in securing for Britain the recent large dollar contract for signalling the new Toronto Subway, Canada.



Mr. F. L. Castle

The Secretary of State for Scotland and the Minister of Fuel and Power have reappointed **Councillor G. R. M'Intosh,** Aberdeen, as a member of the North of Scotland Hydro-Electric Board. This will be his second term of office, each term being of three years duration. Councillor M'Intosh is a Socialist member of Aberdeen Town Council, and was City Treasurer when his party were in office.

Ald. W. J. Bennett, J.P., chairman of the Eastern Electricity Consultative Council, is to make a tour of Germany, from May 1 to 15, in his capacity as a representative of local government. The tour is being sponsored by the Foreign Office, we understand. Mr. Bennett is a member of the Thurrock U.D.C.

Mr. F. J. Lane, O.B.E., M.SC., M.I.E.E., transmission design engineer to the British Electricity Authority, will fly to Portugal on March 15 to lecture in Lisbon and Oporto under the auspices of the British Council and the Ordem dos Engenheiros. His subjects will be "New trends in the application of protective gear on electrical equipment" and "High voltage transmission lines," and he will have the opportunity of meeting the Portuguese engineers under whom the electrification of the country is advancing. He will be away until March 23.

Mr. James C. Hoover, an executive of the American Hoover Co., and second son of Mr. H. W. Hoover, chairman of the American company, has recently been studying the working of Hoover Ltd. Mr. James Hoover's visit follows that of his elder brother, Mr. H. W. Hoover, jnr., president-designate of the American company, which was made some months ago for a similar purpose. On Monday last, he left London by air for Amsterdam, accompanying **Mr. F. H. Bunn,** director and general sales manager of Hoover Ltd., on the first stage of a tour of the company's distributors in Holland, Belgium, Switzerland and France. He is due to return to the United States in April.

Ferranti Ltd. announce that **Mr. E. Murray,** formerly on the sales staff of their Edinburgh factory, is now representing them in the radio and television interest in Scotland along with **Mr. G. L. Cowan.** Mr. Murray's territory will be: Aberdeen, Angus, Banff, Caithness, Clackmannanshire, Fife, Inverness, Kincardine, Kinross, Lanark (excluding Glasgow), Midlothian (excluding Edinburgh), Moray, Nairn, Orkney, Perth, Ross and Cromarty, Shetland, Stirling, Sutherland and West Lothian. Mr. Cowan's territory in future will be the remainder of Scotland including Edinburgh and Glasgow. The territory of **Mr. F. L. Williams** which formerly included the South and South West of Scotland, will now end at the Border. His territory in the Northern Counties of England remains unchanged. Mr. Murray's address is, 15 Craigleith Hill Avenue, Edinburgh 4. Mr. Cowan's address is, 99 High Street, North Berwick, East Lothian. (Telephone, North Berwick 122.)

Ekco-Ensign Electric Ltd. have appointed **Mr. P. E. Graham** as their new representative covering Surrey and Sussex, and certain areas of Hampshire.

Mr. L. E. Meeks and **Mr. H. R. Walton,** B.SC., both previously directors of Electroflo Meters Co. Ltd., have recently joined Elliott Brothers (London) Ltd. Mr. Meeks is closely identified with the production and design sides of the Elliott organisation. Mr. Walton, in addition to his new connection with Elliott Brothers (London) Ltd., has taken charge of sales of the products of Fisher Governor Company Ltd., manufacturers of motor diaphragm valves, regulators, level controllers, etc., and a subsidiary of Elliott Brothers (London) Ltd.

Mr. William Herbert has resigned his position as buyer and manager of the Electrical Dept. of Smith and Sons (Stoke Newington) Ltd. and has now joined Lewis and Lewis, wholesalers and distributors of electrical goods, of Gt. Portland Street, as sales manager and buyer.

Mr. A. P. M. Bennett, M.I.E.E., D.F.H., ASSOC.I. MECH.E., last week left London for New York from whence he will proceed to South America as hydro-electric engineer for the United Nations Organisation. Latterly, Mr. Bennett has been with the Air Ministry, responsible for airfield lighting and remote control at London Airport. Earlier he was for some years with J. Mowlem and Co. after a year or so with Merz and McLellan. His early practical training was gained with Callender's Cable and Construction Co. Ltd., and the County of London Electric Supply Co., after which he spent about three years in Chile mainly on the Queltchues hydro-electric station wherein British equipment was installed. In 1928 he rejoined Callender's in London, as assistant engineer in the Overhead Dept., but early in 1931 he went to Greece where he spent over eight years with the Athens electricity and transport undertakings.

Hopkinsons Ltd., announce the appointment of **Mr. H. L. Collins** as manager of their Controls and Soot Blower Division, following the retirement of **Mr. W. B. Dale.** In addition, **Mr. S. Brook** has been appointed manager of the Soot Blower Department.

E. K. Cole Ltd. announce a change in sales representation in two areas. **Mr. W. F. Valentine,** who has been sales representative in the Eastern Counties for several years, now takes over the Warwickshire area. **Mr. W. E. Mills,** who has been with Ekco for 18 years on the internal sales staff, and lately in charge of schools radio, has been appointed sales representative for the Eastern Counties, comprising Norfolk, Suffolk, North Essex and the extreme eastern strip of Cambridgeshire. Mr. Mills is well known in Norfolk, having spent many years in the area.

The Canadian Westinghouse Co. Ltd. has announced the appointment of **Mr. R. A. Crichton** as industrial sales manager, Toronto District. A graduate in electrical engineering of Edinburgh University, Scotland, he spent several years with electrical and associated industries in Canada and the United States before joining Canadian Westinghouse in 1949. Prior to his recent appointment, Mr. Crichton was Special Representative of the company's Ontario District Manager.

Manager of the public relations and advertising dept. of the Shawinigan Water and Power Co. since 1945, **Mr. Gordon D. Hulme,** has been appointed an assistant vice-president of the company.

Saying farewell to **Mr. L. E. Brickwell,** A.M.INST.F., station superintendent, who is shortly leaving to take up an appointment in Australia, as we have already noted, members of the staff of Poole generating station, Southern Division of the B.E.A., recently made presentations to Mr. and Mrs. Brickwell, at the sports and social club on the station site.

A keen amateur cinematographer, **Mr. H. W. Catton,** deputy station superintendent, Swindon generating station, has won the *Daily Mail* trophy for the most outstanding film in the Institute of Amateur Cinematographers. His entry, "Virtue Triumphant," is a burlesque of the old-fashioned melodrama.

Lighting engineer to Southport Corporation, **Mr. George W. Illingworth** is to act as consultant to the West Lancashire Rural District Council for its street lighting schemes.

Mr. John McLean has been appointed to the Board of the Southern Areas Electric Corporation, Ltd.

Mr. L. Bagrit, managing director of Elliott Brothers (London) Ltd., left London by air last Friday for a business journey to the United States. Elliott Brothers have recently made many notable developments in the field of process control and electronics, and Mr. Bagrit's visit is associated, amongst other things, with the manufacture, under licence in the U.S.A., of certain types of the firm's electronic apparatus.

Mr. H. A. S. Hazelwood, assistant engineer, Engineer-in-Chief's office of the G.P.O., London, aged 70, will shortly retire from the Post Office after 54 years' service.

For many years sole representative in the counties of Essex, Suffolk and Norfolk for the Electric Construction Co., Ltd., **Mr. F. W. Tunstill** has retired, we learn. A former member of the company's London office staff, **Mr. R. H. Bennett,** now residing at 31 Brandeston, Woodbridge, Suffolk, is taking over the representation, but Mr. Tunstill is retaining a few old friends amongst his customers.

Miss Mary Gilbert, Women's Press Liaison Officer of E.D.A., spoke to the Publicity Club of Gothenberg, Sweden, by telephone from London on Monday evening during a discussion on consumer research and consumer education.

OBITUARY

Mr. P. C. Pope, who was secretary of the Institute of Fuel from September 1927 till retiring in February 1946, died on March 1, aged 80. Many in the Electrical Industry knew Mr. Pope well, for during his time with the Institute of Fuel his enthusiasm and energies were largely responsible for the expansion of the Institute and its wider influence in affairs. It was after the 1914-18 war that he became concerned with fuel matters, being elected chairman of the Council of the Institution of Fuel Economy Engineers, and was later a moving spirit in the merger of that organisation with the Institution of Fuel Technologists into the present-day body. Earlier, after an apprenticeship, he served with the British Westinghouse Co., and the Lancashire Power Co., prior to becoming agent in Manchester for Siemens Bros. and Co., early in this century. At this time

he was engaged largely in the application of mechanical and electric power in collieries. His connection with Siemens entailed wide travel in Europe.

Mr. H. A. Cogger, who carried on an electrical contracting business in Maidstone for many years till retiring in 1946, died recently aged 77.

Mr. G. W. H. Clifford, who was employed on the clerical staff of Johnson and Phillips Ltd., died on March 3, aged 74.

Mr. John Banks, M.I.E.E., of the Craven and District Electrical Construction Co. Ltd., died on March 4. He was well known in Yorkshire electrical contracting circles.

Mr. F. W. Peasnell, former manager of the Toronto Hydro-Electric System, died on March 2

Mr. W. T. Knorr, managing director of Electric Boiling Plates Ltd., died on February 27, aged 86. He had spent 70 years in the electrical industry, being actively engaged to within a short time of his death. He served an apprenticeship with Siemens Bros. of Woolwich and later joined Johnson and Phillips Ltd. But in 1901 he commenced business on his own account under the title of the Universal Electric Manufacturing Co., and in 1931 he opened a factory for the manufacture of electric boiling plates, which was converted into the present company in 1946.

Mr. W. Lethersich, B.SC., A.M.I.E.E., F.INST.P., a member of the staff of the British Electrical and Allied Industries Research Association, died on March 2, aged 45. He was a leading expert on the mechanical properties of dielectrics, and also the originator of the use of the Schlieren method of photography to determine the flow of hot air round lamp fittings.

Mr. Cyril Rees, who served with the former Bournemouth and Poole Electricity Supply Co. for many years, died recently. He originally went to Bournemouth in 1903 to supervise the building of the local power station and he later became resident engineer and station superintendent there, remaining until 1935 when the station was closed down. He was one of the first members of the E.P.E.A. and a member of that body's executive committee.

Wills.—Mr. C. T. S. Arnett, late controller of the North Western Division of the B.E.A., left £9,485 gross (£5,886 net value).

Mr. F. Fraser, F.C.I.S., a former secretary and director of the British-Thomson-Houston Co., Ltd., and director of Ferguson, Pailin, Ltd., and other companies, left personal estate in England and Scotland valued at £48,773.

Mr. W. L. Shand, M.I.E.E., formerly for many years with Merz and McLellan, left £416.

NEW LITERATURE

Industrial Directory of Wales

SINCE the first edition of this useful directory was published in 1948 many more industries have been established in Wales and Monmouthshire, and this edition fulfills a valuable service in keeping the relative information up-to-date. Apart from giving news of these trades, the editorial features have been completely revised, but the principal merit of the volume is its extensive classified section of products and services, and the alphabetical list of firms, wherein indication of their manufactures is given. This aid to business will be welcomed. Published by Industrial Association of Wales and Monmouthshire, 338 pages, 9⅝ in. x 7½ in. Price 10s. 6d.

The Oxide Coated Cathode, Vols. I and II

by G. Herrmann and S. Wagener

AT the basis of most electronic devices is to be found the valve; and in the valve the most important single item is the oxide coated cathode. Little literature has existed in the past covering the manufacture and development of these cathodes. As long ago as 1938, however, Messrs. Herrmann and Wagener began to collect all available existing information on this subject with a view to producing a comprehensive review. The intervention of war held up progress, but a first edition in German appeared in 1944.

The work is divided into two volumes. Volume I deals with the manufacturing processes and the cathode characteristics, concluding with some descriptions of special types of cathode as for example those used in gas discharge tubes. Volume II is of much wider interest, as it deals with the physics of the subject. This of necessity introduces fundamental concepts of a more general application. Thus the question of thermal emission from metals and semi-conductors has been dealt with at considerable length—in fact, one half of Volume II is devoted entirely to this general subject. The remainder of the book consists of the application of this treatment to the particular subject of oxide coated cathodes. Published by Chapman and Hall, Volume I, 148 pages, 5¼ in. by 8¼ in. Price 21s. Volume II, 311 pages, 5¼ in. by 8¼ in. Price 42s.

BOOKS RECEIVED

A.S.E.E. Guide to the I.E.E. Wiring Regulations. Notes on and explanation of the twelfth edition. Published by the Association of Supervising Electrical Engineers, 54 Station Road, New Barnet, Herts, 247 pages, 6¼ in. by 4 in. Price, cloth covers, 5s.

Exercises de Radioelectricite, by S. Albagi. Collection of examples on transmission lines and h.f. aerials, with worked answers. Published by Gauthier-Villars, 55 Quai des Grands-Augustins, Paris 6, 76 pages, 9 in. by 6½ in. Price 550 francs.

The BUYER'S *Column*

B.P.L. take over Bryce Meter Dept.

AS from March 1, BRITISH PHYSICAL LABORATORIES of Houseboat Works, Radlett, Herts., have acquired the meter department of Bryce Electric Construction Co., Ltd. The production of their range of switchboard meters, current transformers and speed indicators is being carried on as before. The same service and quality will be guaranteed as all key workers have joined British Physical Laboratories. This arrangement will enable customers to purchase the smallest meters as well as the largest heavy current meters from the same source.

Lustrex Polystyrene Prices Reduced

IN the hope of providing an incentive to moulders to develop new uses and also to bring the domestic market into line with overseas, MONSANTO CHEMICALS, LTD., Victoria Station House, Victoria Street, S.W.1, have announced a substantial reduction in price.

The company say that it was always intended that Lustrex should be available to the moulder at a low price. Now that manufacturing efficiency and production costs are at the optimum level, the firm announced that as from March 1 the price of Lustrex are 2s. 10d. for the clear crystal and 3s. 1d. for colours per lb delivered in the U.K., packed in 50 lb paper bags in a minimum quantity of 500 lb.

Fittings with P.V.C. Reflectors

WITH the present shortage of steel there has been a hasty search for substitute materials. As an alternative to vitreous enamelled steel used in the construction of lighting fittings, CROMPTON PARKINSON LTD., Crompton House, Aldwych, W.C.2, have been developing a form of hard P.V.C. reflector. A typical example of the application of this material to obtain a better product is the new type AV.1114 vapourproof or dustproof fluorescent fitting, an addition to the existing range. These fittings were previously available with either a vitreous enamelled or "Perspex" reflector—the new type has a hard P.V.C. reflector. Although the original idea was to find a substitute for steel, investigations have proved that the P.V.C. has decided advantages of weight, durability and resistance to corrosion when used for certain types of work. Temperature limitations preclude the general use of P.V.C. for all patterns of lighting fitting, but for the special Crompton vapourproof and dustproof designs its properties favour application, perhaps to the permanent exclusion of steel.

The reflector developed by Crompton Parkinson is of a white opaque material, light in weight, and said to be very flexible, and difficult to break by straining or impact. It has a perfectly uniform colour, and a high reflection factor comparable to that of the highest quality vitreous enamels. It is resistant to moisture, oils, alkalines and acids so will retain its colour indefinitely under normal conditions of usage.

In general it is recommended as a superior alternative to the steel reflector type of fitting for all locations where this would normally be used, and where the ambient temperature does not exceed 100° F.

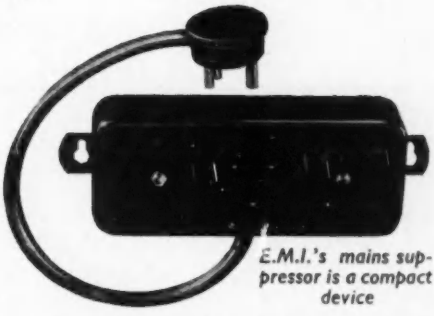
New Eeto Insulation

IN addition to their standard range of heat insulating jackets, a new type has been introduced by EETO INSULATIONS, River Street, Bolton. This is provided with an outer cover of plastic, specially developed to withstand prolonged heat up to boiling point. Its attractive cream-gloss finish, hygienic and easily washable, has proved to be very popular with health authorities, and, while the demand is heavy, quick delivery can be given.

E.M.I. Mains Suppressor

RADIO listeners whose reception is marred by interference from nearby domestic and industrial electrical apparatus will be interested to learn of the development by E.M.I. SALES AND SERVICE LTD., Hayes, Middx., of a new all-wave mains suppressor.

This was designed after a study of the complex nature of all forms of mains-borne interference, and is claimed to provide a far greater degree of suppression than hitherto attained by units of this type.



E.M.I.'s mains suppressor is a compact device

It is equally effective at all frequencies from 150 kc/s to 30 mc/s (i.e. between 10 and 2,000 metres) and is suitable for use with any radio receiver or electrical appliance operating on 100-250 V a.c. or d.c. and drawing up to 5 amp of current.

The suppressor is housed in a neat moulded case, styled to permit simple fixing to a skirting board. For easy connection between the receiver or appliance and the supply point, a mains plug and socket are fitted. Price is 49s. 6d.

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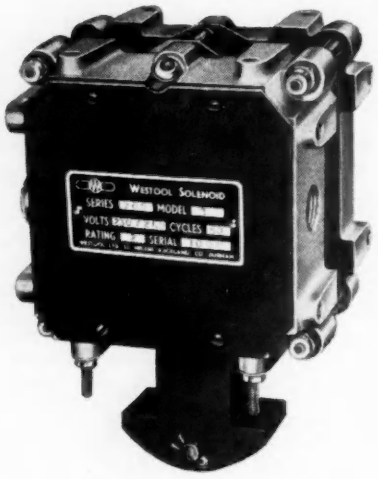


Westool Introduce a New Solenoid

THE series 700 pull-and-thrust type solenoids for a.c. supplies, which were recently introduced by WESTOOL, LTD., St. Helens, Auckland, Co. Durham, are claimed by the makers to be robust and reliable.

They are available in four different models, Number 1 being a "pull" type whilst models 2, 3 and 4 in. are thrust types. They are wound for a.c. single phase supplies for voltages 190 V to 550 V in eight different ranges for standard 50 c/s frequency.

Maximum stroke of the solenoid is $1\frac{3}{4}$ in., this being obtained by the selection of Model 2. Models 3 and 4 permitting 1 in. and $\frac{1}{2}$ in. maximum strokes respectively.

Pole faces are accurately ground to reduce noise and the whole unit frame is enclosed with screwed conduit entry.

The "Stott" Electric Water Boiler

THE "Stott" electric water boiler, introduced by JAMES STOTT & CO. (ENGINEERS) LTD., Vernon Works, Oldham, is of the instantaneous-boiling, constant-flow type, and is fully automatic. There is an automatic cold-water feed and the heating is controlled by the micro switch, so that when the tap is in the closed position only a fraction of the load operates, and when the tap is open the full load is brought into operation.

The water boiler is constructed with an outer jacket and an inner air jacketted core, the latter isolating the cold water from the boiling chamber. As only a relatively small proportion comes in contact with the elements at a given time, the water is boiled instantaneously and is forced up the expansion tube into the receiving trough, where it can be drawn off.

The water boiler is designed with an internal circulation system, so that no stale water collects n the apparatus, and the water is always fresh.

There is no possibility of there being insufficient boiling water at any moment to meet the demand, and also there is no possibility of the elements burning out. Owing to the fact that the boiler is designed to give nothing but boiling water, it is particularly suitable for tea making, as well as for coffee and other beverages.

TRADE PUBLICATIONS

WIRING ACCESSORIES.—Now published by Simplex Electric Co. Ltd., Oldbury, Birmingham, is the new Simplex "Lundberg" accessories specification folder (Serial No. LA1908) which features the range of London switches.

MILL EQUIPMENT.—Electrical equipment of strip mills is featured in a reprint from "ACEC Charleroi," review No. 21951, which has been published by the company.

CHEMICALS AND PLASTICS.—A handbook featuring chemicals and plastics materials, and the plant in which they are produced, has now been issued by Monsanto Chemicals Ltd., Victoria Station House, London S.W.1.

WELDING EQUIPMENT.—An electronically controlled 4 kVA spot welder supplied by G.E.C. is featured in an illustrated leaflet issued by General Electric Co. Ltd., Magnet House, Kingsway, W.C.2.

FLEXIBLE CONDUIT.—"Kopex" conduit, which is formed from continuous strips of metal plastic paper or other suitable materials corrugated to lock together, is described in a leaflet issued by Uni-tubes Ltd., Alpha Works, Slough, Bucks.

FLUID FLOW METERS.—Latest catalogue 51k, which features the range of control instruments made by the company, is now available from Solway Flowrators Ltd., Abbey Road, Park Royal, London N.W.10.

AIR CLEANSING EQUIPMENT.—Revised editions of two brochures, featuring (No. 521) "Visco Air Filters" and (No. 522) "Visco Self-cleaning Air Filters," have been published by Visco Engineering Co. Ltd., Stafford Road, Croydon. The latter describes for the first time the "Oilspray" type of self-cleaning filter for use where the air is exceptionally dirty.

CURRENT TRANSFORMERS.—Type FKB and Type FKO current transformers are the subjects of two new publications issued by the English Electric Co. Ltd., Queens House, Kingsway, W.C.2.

RUBBER DEVELOPMENTS.—Broadsheet No. 2 issued for Rubber Technical Developments Ltd., 78 Bridge Road East, Welwyn Garden City, deals specifically with fluid rubber compositions, their preparation and applications.

Ferranti Computor for Canada

THE second large computing machine of the series being made by Ferranti Ltd., has now been completed and will shortly be shipped to its purchasers—the National Research Council of Canada. It will be erected in the University of Toronto.

Basically, the machine is similar to the large computor in the Manchester University which has now been operating since July last. This machine has proved most satisfactory and is now working twenty-four hours a day on a variety of problems, mostly involving complex scientific and engineering computations.

The Manchester unit marks, from an industrial viewpoint, an important step in computor design as it is the first "production" model as compared with the numerous special machines which have been built by various organisations on a "one off" basis.

Details of the computor have already been given in the ELECTRICAL TIMES of July 12, 1951; the new machine, however, embodies a series of detail improvements to the design, based on past operating experience. Thus the Canadians will obtain a model which, it is believed, will give them facilities second to none in the world.

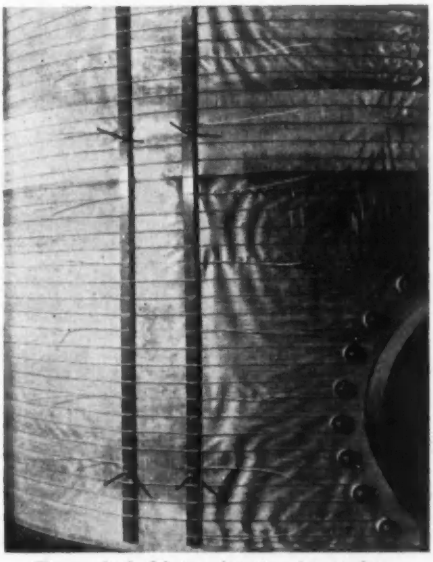
Turning to the general subject of computing machines, it should be emphasised that they are not "electronic brains" in the true sense of the words, although it is now certain that they can be arranged to learn from experience. This is because they have the capacity to choose between several courses of action, and the memory storage can be made to remember that one of these resulted in failure in the past, so another can be tried. With this sole exception the machines are really similar to automatic clerks, performing a series of simple operations at enormous speed, and it is still a long way to the mechanical manager of an automatic factory.

HEATING SUGAR VATS

THREE years ago Messrs. Courage and Co., Ltd., brewers, were faced with the problem of maintaining the temperature of sugar syrup in two 60-barrel capacity tanks at their Alton brewery at 110° F, with a minimum ambient temperature of 40° F. They approached the General Electric Co., Ltd., and suggested that these tanks, which are 5 ft 6 in. in diameter and 8 ft high, should be heated by elements from the outside. This has been done by means of 15 s.w.g. galvanised soil-heating wire laid on each tank in 12 sections of four turns each. The sections are connected in parallel and fed from a 2·5 kVA soil-heating transformer on a 15 V secondary winding. They are controlled by means of a suitable calibrated long-stemmed thermostat inserted into the liquid near the bottom of the tank.

To support the busbars and wire spacers, studs were welded to the exterior of the tank at suitable intervals. The tank was then served overall with a layer of glass-fibre cloth impregnated with special shellac "dope," wire spacers suitably slotted were placed in position and the wire was wound on. Another layer of glass-fibre cloth was then laid overall and the terminations of the windings brought out to the busbars held on the studs. Finally, two layers of cork slab lagging 1½ in. thick were put over the whole installation, and held in position by a sheet metal cover drawn tight by suitable tensioners.

Satisfaction with the apparatus, which has now been in use for two years, has been expressed by the placing of further orders for three similar tanks now in course of construction at the London brewery of Messrs. Courage and Co., Ltd.



The method of fixing the wires is seen here

The WEEK in NEWS

N. W. Industrial Tariff Raised 16%

First Increase Since Vesting Day

LATEST repercussions on the electrical industry following increases in wages and the cost of coal and materials, is a rise in the industrial tariff in the North Western Electricity Board's area. The new standard industrial tariff has been approved by the B.E.A. and Consultative Council. The increase, which is to average about 16%, will affect some 3,000 consumers, and becomes operative on April 1.

The new charges will be based on two factors, the maximum demand for electricity and the amount of current consumed. Where electricity is delivered from the board's high-voltage system to a consumer's substation, a monthly charge of 11s 6d a kW of maximum demand will be made for the first 200 kW, 11s for the next 300 kW 10s 6d for the next 500 kW, and a charge of 10s for every kW of maximum demand above 1,000.

In cases where medium-voltage electricity is supplied, a monthly charge of 12s 6d will be imposed for every kW of maximum demand. In addition, there will be a charge of 0·46d a unit for first 200 units per kW of maximum demand, 0·42d a unit for next 300, and 0·38d for additional units. Existing provisions for varying coal prices and where equipment is supplied by the user, are to be continued.

This tariff is expected to provide an additional £1,400,000 a year revenue for the Board.

Apart from the automatic increases in charges following rises in the cost of coal, as provided for by special clauses, this is the first time industrial tariffs have been raised since vesting day. Domestic tariffs were adjusted in 1948 and again last year.

Both the F.B.I. and N.U.M. have expressed concern at the charges and criticised the Board for failing to consult industry before their introduction. In some cases, it is alleged, increases will amount to some 50%. The Board has stated that opportunities had been afforded to industrialists to come forward, and had not been taken.

The First Half-Century

On Friday last the members of the Royal Institution were shown by Professor H. Becquerel a specimen of chloride of radium. In the light this exceedingly rare and precious substance has not a distinguished appearance. Whence and how it obtains the energy which is radiated continuously is a puzzle. Extraordinary as is the visible radiation, it is as nothing compared with those which are invisible. These are not ethereal, but corpuscular, and, in contradistinction to the Rontgen radiations, are spoken of after the name of their first observer as Becquerel rays. They were first observed, of course, in connection with uranium, which—although Lord Kelvin suggested it must be bewitched—is a very poor performer compared with radium.—*From our issue of March* 13, 1902.

£1m Extra for Rural Schemes

ANNOUNCEMENTS concerning the allocation of £1 million specifically for rural development throughout the country were made at meetings of the Eastern and S.E. Scotland Electricity Consultative Councils last week. We understand that this sum is part of a total of £4 million allocated over and above previous estimates to the Central Authority for various works.

Details of the sums to be given to the 13 Area Boards (London excluded) are not yet known, but Mr. J. M. Airlie, chairman of the Scottish Council, mentioning a figure of £20,000 for that area, said it would be useless. The Board, he said, was to ask for £50,000.

The announcement to the Eastern Consultative Council followed strong representations at their January meeting deploring the fact that rural electrification schemes had apparently ceased. Despite the guarantee of £1 million, members again resolved to stress the need for such development and asked that they be notified of any programme which the Board compiles for the expenditure of its share of the total sum. Ald. W. J. Bennett warned the council that the question would now arise as to whether the necessary materials were available.

Considering the Board's notification of the rise in the bulk supply tariff, members sought an explanation as to what had happened to the 3s 9d in the previous charge of £4 2s 6d, which, they asserted, was an additional forced levy at that time designed to prevent frequent fluctuations in bulk supply charges.

AUSTRALIA CUTS IMPORTS

Domestic Appliances Hard Hit

MAJOR cuts in imports, with effect from last Saturday, have been announced by the Australian Government. Imports will be licensed in three categories—"A," allowing importation of 60% of the value of orders during the financial year ending June 30 last; "B," amounting to 20% of that year's value, while in the third category are goods which cannot be handled on a quota basis, and which will be dealt with administratively. The class "A" list includes aluminium wire, brass and other non-ferrous alloys, manufactured copper, telephone and telegraph hand sets, switchboards and car batteries. Goods on the Class "B" list include washing machines, refrigerators, floor polishers, dishwashing machines, wireless receivers, cooking stoves, electric fans and lamps. The third category will deal with such items as boilers and steam turbines, electrical regulating gear, industrial plant, railway and tramway vehicles.

Some idea of the effect of the cuts may be gauged from the fact that electrical goods in Class "F" exported from Britain to Australia last year totalled £10,967,099. The number and value of certain electrical goods affected, exported from U.K. to Australia, during 1951 are given below.

	Number	*Value £*
Cookers ...	34,979	800,011
Washing machines	149,770	2,910,932
Floor polishers	51,895	493,616
Refrigerators (up to 12 c. ft)	32,540	1,440,621
Switchgear and switchboards		1,872,154

In announcing the cuts, Mr. Menzies, the Prime Minister, stressed that they were emergency measures to help redress the Australia trade balance of imports. The licensing system covers all classes of goods, with few exceptions.

Fuel Auditing

THE auditing of a company's books to keep track of financial income and expenditure is a common enough operation, but one is not so familiar with the audit of fuel, heat and power. This latter operation has, however, been carried out successfully during the past three years at some 125 works by the Fuel Efficiency Advisory Service of the Ministry of Fuel and Power. A description of the work and equipment used forms the subject of a paper to the Institute of Fuel next Tuesday. The meeting is to take place at the Institution of Mechanical Engineers, and we understand there are a few advance copies of the paper available at 3s. 6d. to non-members.

LIGHTING UNIT DESIGNED FOR TRAFFIC SIGNS

MOTORISTS who have to drive along unfamiliar roads at night have at one time or another striven to decipher the directions on sign posts and failed because of the lack of light on that part of the road. The consequent distraction may very easily lead to an accident, and thus the new lighting fitting designed by Franco Traffic Signs Ltd. will make a substantial contribution in the road safety campaign as well as being a valuable aid to motorists.

These new fittings are made of aluminium and are fixed to the signs by an angle arm. They have been manufactured in two sizes, 31 in. and 16½ in., the larger housing a 30 in. cold cathode fluorescent lamp. The smaller unit uses a lamp of the same length but bent double. This is believed to be the first time cold cathode fluorescent lamps have been used for this purpose. A medium voltage transformer of 240 V input and 450 V output has been incorporated. The lamp aperture has been enclosed by Perspex or plate glass. The fitting has been finished in stove-enamelled black and is fully watertight.

Franco's new fluorescent fitting to illuminate traffic signs

Kirk o' Shotts TV Opens Tomorrow

THE first regular programmes from Kirk o' Shotts TV station are to begin tomorrow, March 14, using the medium power vision transmitter on a frequency of 56.75 Mc/s (5.3 metres), sound transmitters on 53.25 Mc/s (5.635 metres) and the main mast and aerial system.

Notable feature of this station is that in the transmission line of the coaxial copper tube type, the inner tube has been replaced by a locked coil wire rope, the outer layer of wires being made of high-conductivity copper. This rope, together with the 5-in. diameter copper tube forming the outer conductor, is suspended pendulum fashion from a support at the top of the mast.

Lord Citrine on B.E.A.

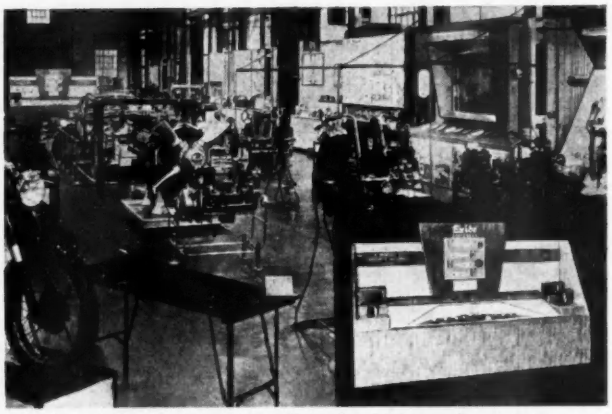
LORD CITRINE is to address members of the Institute of Public Administration on the B.E.A. on March 24. This will be the fourth and final talk in a series of lectures on maintaining and improving efficiency in the nationalised industries. It will take place at the Institution of Civil Engineers, Gt. George St., London, at 6.15 p.m.

BENEVOLENCE OF TRAVELLERS

THE annual luncheon of the Electrical Trades' Commercial Travellers' Association, held last Friday, was attended by over 600 members and guests. Heading the speeches, Mr. S. Johnson, who has entered his twentieth year as Charity Steward, made a special appeal for additional support for the Association's benevolent work. Proposing the toast of The Association, Mr. Collin Brooks humorously raised contentious topics such as the feud often existing between inside and outside men. But stressing the precariousness of the vocation, he believed that the existence of the Association must have been as a sheet anchor in a storm to many who had fallen on bad times. Mr. W. J. Jones, director of E.L.M.A., suitably proposed the toast of "Our Guests," to which Mr. Michael Romain made a witty response. Afterwards Mr. L. A. Fickling, the immediate past chairman, eulogised on the virtues of the present chairman, Mr. A. Watson, to which the latter replied, paying tribute to the work of his colleagues in office. A collection realised £141.

SELLING UNDERLINED AT IPSWICH DINNER

THIS year's annual dinner of the Ipswich and District Electrical Association was characterised by a distinguished top table and a rather long toast list. The toast of "The Association" was proposed by Lord Citrine, who spoke of the load shortage and the responsibilities of the B.E.A. The Chairman, Mr. H. B. Campbell, responded. "The Industry" was toasted by Ald. S. C. Grimwade, with a reply by Mr. W. N. C. Clinch. An unusual toast, that of "Our Customers," was developed into a theme of selling and service by Mr. S. F. Steward, which was carried on by Ald. W. J. Bennett in stressing that it is the duty of engineers to solve the problems created by consumers. Guests were welcomed by the President, Mr. C. T. Melling, the Mayor of Ipswich responding.



A view of the demonstration hall in the driving and maintenance wing at Royal Military Academy, Sandhurst. Inset shows the newly designed exhibit illustrating electro-chemical principles on which the storage battery is based, the various materials used and process of manufacture, which has been installed by Chloride Batteries Ltd. Finished in two shades of polished wood, the display is 12 ft. long and 8 ft. high. The exhibit itself is in the background

OFFICIAL PUBLICATIONS

BRITISH STANDARDS

B.S.1824 : Nickel silver strip and foil for the telecommunication industries. Amendments PD1322 to the following standards for lamps and lamp caps : B552, 98, 161, 469, 535, 555, 867, 941, and 1164 (economy of solder for contact plates); PD1325 to BS156 : Enamelled round copper wire (oleoresinous enamel); PD1326 to BS1133 : Sections 1 to 3, Introduction to packaging; PD1334 to BS904 : Dimensions of instrument jewels.

E.R.A. REPORTS

B/T111 Review of Problems of h.v. d.c. transmission and future possibilities (price 7s. 9d.); *G/T255 Gas-blast circuit-breakers. Effect of arcing on the mass-flow of air through the nozzle and on the nozzle pressure* (price 10s. 4d.); *L/T253 Bound electronic states in solids, resulting from a "potential hill"* (price 6s. 3d.); *L/T265 Theory of barium titanate—part 2* (price 10s. 4d.); *M/T113 A pulse generator producing 0.1 microsecond pulses* (price 7s. 9d.); *V/T109 The incidence and avoidance of high resistance joints on steel conduit in service* (price 12s. 3d.) *(obtainable post paid at the prices indicated from E.R.A., Thorncroft Manor, Dorking Road, Leatherhead).*

MONOPOLIES AND RESTRICTIVE PRACTICES COMMISSION.

H.M.S.O., 6d.

Annual Report by the B.o.T. for 1951. Reviews work of commission during the year.

Scholarship for Young Engineers

THROUGH the generosity of the Maudsley Society, the Junior Institution of Engineers is to offer a scholarship to young engineers. It will be known as the Maudsley Scholarship and will amount to £150 for one year. Candidates must be under 26 and either an engineer or training for posts in mechanical engineering. Applications should be submitted by July 31.

The same Institution has also announced its annual offer of the Durham Bursary valued at £20. Entrants will be required to submit a thesis on some engineering, technical or scientific subject. Entry forms are available from the J.I.E. and theses must be tendered by August 1.

Lecture May Be Overcrowded

E.L.M.A.'s special lecture on "Lighting for Coal Production," which is to take place in Newcastle on March 27, is likely to be overcrowded and tickets are to be issued to limit attendance to the accommodation available. Engineers wishing to attend should apply to Mr. R. J. Fothergill, 60 Stockton Rd., West Hartlepool.

Injury from Unguarded Machinery

IF an employee is injured while adjusting a temporarily unguarded machine manufactured at the factory, and intended for sale, is he entitled to damages? That was the basis of an appeal, judgement on which was given in the House of Lords last week. The firm was the Morton Machine Co.; the machine, known as a dough brake, had been manufactured, assembled and tested, but for the purpose of adjustment, a guard was removed, resulting in an injury to an apprentice fitter, it was stated. The latter claimed damages. The appeal submitted for decision the novel question whether sections 14, 16 and 20 of the Factories Act, 1937, applied to machines within the factory which were products of the factory. The House dismissed the appeal.

DEMAND REMAINS FOR ELECTRICAL ENGINEERS

OFFERS of employment far exceed the number of actual appointments made due to the present abnormal demands for engineers with specialised experience, states the Professional Engineers Appointments Bureau in its annual report for 1951. Figures show that there has been an increase in the number of placings over 1950.

There was a total of 1,070 vacancies of which 253 were for electrical engineers and on the opposite side of the picture, the report states, there were 1,679 enrolments, including 528 electrical engineers. An interesting point in the report, in view of current unrest among the over-45s who allege it is almost impossible to find work, is that over 10% of those engineers placed were over 50.

Once again the majority of overseas vacancies notified were for posts in the Middle East, India and Pakistan. The Bureau's policy is to submit every engineer, irrespective of age, unless the employer specifically states an age limit. The success achieved during the past year in finding work for the older engineers indicates a co-operative response to the appeal made last year seeking a rise in the upper age limit.

A Year in Pictures

OVER 60 pages of illustrations are included in a brochure produced by the English Electric Co., Ltd., depicting the company's activities during the financial year, 1951-52. The brochure has been circulated with the company's annual report and gives an excellent summary of the many fields in which English Electric operates. Financial details may be found on page 507.

New Lighting in Parliament Square

RENOVATIONS in Parliament Square carried out for last year's Festival of Britain have been considerably improved by the completion recently of a new lighting scheme. It will be seen from the accompanying illustrations that the concrete columns which seem increasingly popular these days have been overlooked in favour of a standard not unlike those used in the days of gas lamps.

The standards chosen were, in fact, specially made by Revo Electric Co., Ltd., for the scheme and the blending with their surroundings is remarkable and truly pleasing. The fittings comprise a spun copper canopy with white reflecting surface and internal dome refractor with enclosed well glass. They house a 1,500 W tungsten lamp. Smaller fittings and columns of similar design and housing two 150 W lamps have been erected on refuge islands. The equipment was installed by the London Electricity Board.

While on the subject of street lighting, we note that Revo Electric have also been concerned with a scheme in Hendon along Hendon Way and the North Circular Rd. There concrete columns were used—just over 150 units in all—covering a distance of nearly three miles. "Silvergold" lighting fittings have been mounted on the columns, each carrying 140 W sodium discharge lamps.

Day and night views of Parliament Square following new lighting installation.

Industrial Expansion in Ceylon

ONE of the problems confronting Ceylon is the lack of industry in the island. It is considered that the country should have at least a few basic secondary industries which would not only assist in time of emergency but also provide more work for an increasing population. Industrial development is, however, handicapped by lack of power. This and other matters connected with Ceylon are dealt with in the Overseas Economic Survey for that country just published by H.M.S.O.

Plans for this development are based largely on the Norton Bridge hydro-electric scheme, which was started as long ago as 1927 and been continued intermittently ever since. Stage 1 was completed two years ago but there are still three more stages to be inaugurated. Final output for all stages will be about 125,000 kW. Almost all the plant at Norton Bridge was made in the U.K.

As regards imports of consumer goods from Britain, trade in electrical commodities has been steadily rising in recent years but if the U.K. is to keep her position as Ceylon's principal supplier, the quantity of goods in this field must be maintained at least.

Management Diploma

THE Ministry of Education and British Institute of Management are prepared to receive applications for the approval of schemes for the award of diplomas in management studies. Instead of separate diplomas for each of the functional branches of management, there is to be a single diploma covering two obligatory subjects and four others chosen from a range of optional subjects. Additional subjects may be added later as the occasion demands. Normally, the course will cover two years of part-time study.

E.A.W. BRANCH JUBILEE

THE silver jubilee dinner of the Newcastle branch of E.A.W., which took place a short time ago, was honoured by the presence of the Minister of Food, Maj. Gwilym Lloyd George. Maj. Lloyd George praised the Association for its work, speaking from his experience as a former Minister of Fuel and Power. Dame Caroline Haslett replied. Others present were the Lord Mayor of Newcastle and Mr. H. H. Mullens, chairman of the N.W. Electricity Board.

To mark the occasion, Dame Caroline and the Branch Committee were entertained at lunch and a tour of the works by A. Reyrolle and Co., Ltd.

NEWS IN BRIEF

Ministry of Works reminds architects, surveyors and other advisors that professional fees are no longer part of licensable costs of building work and should not be included in applications for building licences. The reminder follows judgment in the Court of Appeal last January.

In future, changes in the cost of electricity will be calculated on an annual consumption of 1,000 units in the revised Retail Price Index announced last week.

Sheffield branch of E.I.B.A. are to hold their annual dinner and dance at the Royal Victoria Hotel on March 21.

Five-day study course on wages and salaries is being arranged by the Institute of Personnel Management from April 20 to 25.

Association of Steel Conduit Manufacturers held its 13th annual dinner in Birmingham recently. About 60 members and guests were present. Toast of the Association was proposed by Mr. C. R. Wheeler, and the chairman, Mr. J. M. Surrall, replied.

Three G.E.C. pensioners who retired last year were entertained by the company at the Connaught Rooms recently.

The U.S. Productivity Team which is now in this country to study the British electricity supply industry. Back row, left to right, are : J. C. Falkner; T. E. Craddock; H. K. Breckenridge; F. L. Goss; G. H. Brodnax; F. H. Austin; R. M. Pennypacker; P. J. Frantz. Sitting are E. V. Sales; W. R. Munger; W. Good; F. D. Parker; C. W. Jones (leader); H. E. Bumgardner; G. X. Barker; G. V. Williamson; C. Lee Karr

Questions in Parliament . . .

Dockyard Electrical Managers

In a written reply last week Mr. J. P. L. Thomas, the First Lord of the Admiralty, stated that no change in the number of civilian managers in charge of the electrical departments of the Royal Dockyards was contemplated at present. It was, however, intended that in due course they should be filled by naval officers of the Electrical Branch.

N.W. Board Appointments

In regard to the members of the N.W. Electricity Board whose appointments were due to expire towards the end of this year, Mr. Geoffrey Lloyd said he would consider what action was to be taken in due course.

Public Appointments

Replying to Mr. J. Morrison, the Financial Secretary to the Treasury (Mr. Boyd-Carpenter) said that he would in future make arrangements for all new appointments or reappointments to public boards to be published as they occur in the *London Gazette*.

Street Lighting

Last week the Minister of Transport was questioned on his attitude to the confusion caused to motorists by the widely differing types of street lighting used in the areas of different local authorities. He replied that he had no strong evidence to show that differing types of street lighting caused confusion. He thought that there would be disadvantages in absolute standardisation of street lighting.

Telephone Payboxes

Asked to consider the alterations of pay boxes on public telephones to take threepenny pieces, the Assistant Postmaster-General while admitting the convenience this would give, said that considerations of economy would not justify the Post Office in altering equipment in 58,000 public call boxes.

Exports of Scrap

Asked whether he would prohibit the export of iron and steel scrap, the President of the Board of Trade said licences had to be obtained for such exports, and his department's present policy was to refuse those licences.

Fireguards

In a written answer last week, Sir David Maxwell Fyfe told the House that the Heating Appliances (Fireguards) Bill would be read a second time tomorrow, Friday.

Factory Inspectors

The Minister of Labour last week gave some details of existing vacancies for factory inspectors. He said that at present there were 30 vacancies, which figure would probably be reduced to 22 this year. The shortage, he said, could be attributed to the suspension of recruitment during the war years. The reason for the continuing shortage was the heavy demand in industry and Government service for persons with qualifications similar to those required in recruits for the factory inspectorate.

Electric Supply News . . .

Glasgow

The B.E.A. has received the consent of the Ministry of Fuel and Power to the extension of the Clyde's Mill power station, Glasgow, by the installation of two 30 MW turbo-alternators and four 180 klb/hr boilers.

Hoddesdon

Work has begun on the erection of overhead transmission lines from Rye power station to Hatfield, crossing Hoddesdon. When the proposed route was first put forward, the U.D.C. objected to an overhead line over the town, but it was sanctioned following a public inquiry.

Inverness-shire

A contract for the construction of two concrete dams and five miles of tunnelling to be built at Glen Moriston, forty miles south-west of Inverness, has been placed with the Mitchell Construction Co. Ltd., by the North of Scotland Hydro-Electric Board. The contract is valued at nearly £5,000,000. The work will involve the building of a small township to house the 1,000 workmen. It is expected that work on the dams and tunnels will commence on March 31. The dams on each side of the mountains will probably take four years to complete.

Newton Abbot

The dispute between the Rural District Council and the South Western Electricity Board over the question of rental for a substation site (to which we referred on December 20), has now been resolved. The Board has agreed to purchase the site, the council has been told. So the new houses on a Kingsteignton estate will soon be connected.

Seaton Valley (Northumberland)

The Urban District Council has asked the North Eastern Electricity Board to receive a deputation to discuss the installation of electric

lighting in more houses in the area. The Board informed the Council recently, however, that under present conditions restricting capital expenditure, it was not possible to install an alternative form of lighting in houses which already had a lighting system. The Council has been receiving numerous requests from various districts asking for electricity to be installed in place of gas.

Walsall

This new generating station which was put into commercial operation by the Midlands Division of the B.E.A. in July, 1949, is rapidly nearing completion. There are now four 30 MW sets running, and the last two generators and four final boilers are to be brought into service next year, to bring the station to its ultimate capacity of 180 MW. The station was originally planned by the West Midlands Joint Electricity Authority.

Worcester

Afraid that high voltage cables suspended above a school playground may break one day, the city education committee has advised the withdrawal of a 22-year-old agreement which permits the B.E.A. to keep the cables there. The cables, which supply power to the surrounding district, are partly supported by a pylon standing in the playground of Gorse Hill Primary School, it is reported. The B.E.A. apparently have offered to put an anti-climbing barrier round the pylon, but the Committee is asking for the erection of protection cradles under the lines. This the B.E.A. refuse to do, it is stated.

LIGHTING SCHEMES

Aberdeen.—The first stretch of fluorescent lighting in Aberdeen—in Holburn Street—was switched on recently. The T.C. has approved the installation of similar lighting in George Street, but M.o.T. approval is awaited.

Bexhill.—A plan to spend £1,000 on illuminations for the town's jubilee this summer has received Ministerial approval.

Billinge.—The U.D.C. surveyor has prepared a scheme for new street lighting facilities on the main roads.

Chester.—T.C. recommended to apply for consent to borrow £3,229 for lighting part of Blacon estate.

Heston and Isleworth.—Improved lighting is to be installed along part of the Bath Road, at a cost of £5,300.

Hinckley.—The U.D.C. proposes to spend £6,658 on the erection of a further 295 electric lamps in the current year.

Jarrow-on-Tyne.—A revised estimate of £4,900 has been adopted by the T.C. for the provision of electric lighting in Leam Lane.

Maidenhead.—T.C. has forwarded to M.o.T. a scheme for lighting in the Bath Road.

Morecambe and Heysham.—The T.C. is to spend £26,000 on this year's illuminations in addition to subscriptions received in response to the recent appeal for funds to save the scheme.

Company Activities . . .

Associated Electrical Industries

The assets of the group totalled £67,009,545, an increase of £10,694,683, and is shown in the full accounts. Of that total, stock and work in progress amount to £30,497,630 (*£23,464,714*). Current liabilities total £27,583,290 (*£21,831,198*). The holdings of trade investments have increased from £2,023,587 to £3,606,628.

Barbados Electric Supply Corp. Ltd.

For the year to June 30 last, the trading profit after charging deferred repairs, etc., is £44,798 (*£37,611*). Depreciation absorbs £15,909 (*£11,923*) and taxation £10,000 (*£8,500*). The Ordinary dividend is again 5% tax free, and there is £3,795 (*£2,898*) carried forward.

Thomas Bolton and Sons

Trading profit for 1951 is £614,831 (*£334,157*). There is a final dividend of 7½% (*same*) and bonus 2½% (*nil*) making 12½% (*10%*). Taxation absorbs £327,193 (*£170,700*) and depreciation £78,333 (*£76,298*). To reserve for possible future losses on stock £50,000 (*nil*), general reserve £50,000 (*nil*), leaving £142,768 (*£133,90-*) carried forward.

British Industrial Plastics

The trading profit for the year to September 30 last is £626,439 (*£443,237*). After charging depreciation, research, pensions, etc., the profit before taxation is £413,096 (*£275,815*). Taxation absorbs £257,113 (*£166,849*). After payment of dividends, including final Ordinary of 10%, there is £133,058 (*£123,702*) carried forward to the consolidated balance sheet.

British Insulated Callender's Cable Co.

In regard to the proposal to raise £3,400,000 of new capital, it has been decided to offer 3,109,614 new Ordinary shares of £1 at a price of 22s each. Ordinary shareholders have the right to take up one new share for every £3 of Ordinary stock held. This will leave a small balance of shares for which the Ordinary stockholders will also be invited to apply. Details are being circulated on March 28.

Brown Brothers Ltd.

The group profit for 1951, before taxation, is £873,640 (*£536,041*). Taxation absorbs £513,264 (*£286,261*) leaving a net profit of £360,376 (*£249,780*), of which £276,848 (*£195,179*) relates

to the parent company. The final Ordinary dividend is again 10% making 12½% (*same*).

Desoutter Brothers (Holdings)

New machine tools and equipment, valued at approximately £30,000, were received during 1951, Mr. E. R. Desoutter, chairman, points out in his statement, but complete deliveries of all the tools required for the new factory extension will not be obtained before the end of 1953 or even later. The full value of these developments has not, therefore, been obtained during 1951, yet sales volume increased 17% above 1950.

English Electric Co. Ltd.

In the full accounts for 1951, stocks and work in progress are listed at £34,774,543—nearly £10,000,000 more than for the previous year—a good indication of the continued increase in the group turnover. The financing of the expansion has been partly relieved by an increase of about £3,500,000 in payments received on account, but the bank overdraft has risen to £5,861,000 (*£4,249,000*). As we briefly recorded last week the consolidated trading balance for 1951 amounted to £3,827,443 (*£3,236,524*), which, with sundry items is raised to £3,948,525 (*£3,275,820*). The sum of £196,384 (*£173,470*) goes to interest on loan capital, £58,000 (*£50,000*) to contingencies, and £52,000 (*£55,000*) to depreciation equalisation reserve. Taxation absorbs £2,286,611 (*£1,896,328*), and of the balance £1,326,721 (*£1,049,892*) is applicable to the English Electric Co. Ltd. Group current assets are listed at £37,223,584 compared with £28,805,755 for the previous year.

Ericsson Telephones

Trading profit for 1951, before taxation, is £1,009,101 (*£1,188,223*). There is a final dividend of 12% and bonus 5%, both tax free on the larger capital. After providing £557,902 (*£615,609*) for taxation, and placing £20,000 (*£40,000*) to tax equalisation reserve, the net profit is £431,199 (*£532,614*). To general reserve £328,113 (*£396,880*), and dividends £106,101 (*£90,477*), leaving £203,188 (*£213,551*) carried forward.

International Combustion (Holdings)

The combined trading profit for the year to September 30 last, at £1,222,599 was the highest in the group's history, being £319,671 more than the previous year. This was due to a larger output and increased profits of subsidiary and other companies. By adding sundry income the total profit becomes £1,262,338 (*£923,350*). Taxation absorbs £724,604 (*£531,377*) leaving a net profit of £537,734 (*£391,973*), of which £507,023 (*£131,985*) relates to the parent company. Of the latter sum £350,000 (*nil*) is transferred to general reserve and the dividends require a total of £120,233 (*£101,665*). The group carry forward is £207,028 (*£167,451*). The group current assets are listed at £7,334,858 (*£6,537,057*) of which stock and work in progress accounts for £4,791,395 (*£3,764,027*). Current liabilities and provisions total £5,107,274 (*£4,879,799*).

Jerusalem Electric & P.S. Corporation

It is announced that the consent of the British Treasury and of the Israel Government has been obtained to the proposed offer to be made by Palestine Electric Corporation Ltd. for the share capital of the Jerusalem undertaking. A representative of the latter company has gone to Jerusalem to examine with the Government of Israel the effect of the new currency regulations.

Mather & Platt Ltd.

The consolidated trading profit for 1951 was higher by £181,696 at £1,499,497, to which investment income of £375 (*£517*) is added. The sum of £86,224 (*£78,681*) is charged to depreciation, £54,800 (*£50,000*) is written off shares in subsidiaries, and the transfer to stock in-trade contingency reserve is doubled at £200,000. Taxation absorbs £824,105 (*£615,946*), and after deducting the proportion of subsidiaries' profits attributable to outside members, the consolidated net profit is £333,313 (*£414,273*). Of this, £40,183 (*£52,733*) is retained by subsidiaries. After transferring £150,000 to general reserve, which now stands at £350,000, the carry forward is £103,905 (*£105,510*).

Midland Electric Manufacturing Co.

The preliminary statement shows a net profit for 1951, after taxation, of £138,611 (*£129,616*). Taxation takes £199,000 (*£162,485*). The dividend is again 15%.

Taylor Tunnicliff (Electrical Industries) Ltd.

The consolidated trading profit for 1951 amounts to £448,178 (*£359,922*), which, with sundry income is increased to £452,783 (*£363,784*). Directors' fees, etc., absorb £19,729 (*£20,673*), audit fee £711 (*£564*), to depreciation £36,039 (*£32,962*), taxation £236,741 (*£167,826*), administration expenses of parent company £573 (*£540*), and proportion of profit attributable to outside interests £3,402 (*£4,542*), leaving a net profit of £155,568 (*£136,677*). With £333,472 brought in there is £489,040 available. Dividends, including Ordinary of 20% take £37,275 (*£39,050*), and with £20,000 (*same*) written off goodwill there is £431,765 carried forward.

Thorn and Hoddle Ltd.

For the year to September 30 last the gross trading profit amounted to £22,556 (*£18,265*). After taxation of £2,692 (*£1,636*) and other charges, there is a balance of £1,716 (*£1,590*). Written off goodwill £1,000 (*same*), there is an Ordinary dividend of 10% (*same*), and £6,642 (*£6,828*) is carried forward.

Dividends Declared

Morphy-Richards.—Interim of 15% (*same, but on smaller capital*).

Singapore Traction.—Payment of four years' arrears of the Preference dividend, just announced, brings payment up to September 30, 1950.

Stothert and Pitt.—Interim of 5% (*same*).

Commercial Information

CONTRACTS OPEN

HOME

Mar. 14.—Belfast. Electrical alterations and additions at Central Chest Clinic, Durham St., for N. Ireland Tuberculosis Authority. Deposit of £5 5s. to W. Harvey, Secretary, 27 Adelaide St., Belfast. Documents may be had on production of receipt from J. R. W. Murland, Consulting Engineer, 13 Wellington Place, Belfast.

Mar. 14.—Bristol. Supply of electric lamps and batteries. Central Purchasing Dept., 2 Upper York St., St. Paul's, Bristol.

Mar. 14.—Dublin. Installation to be carried out at service station, Santry, for McCairns Motors Ltd., includes lighting, inter-com. system, power, cooking installation and main switchgear. Varming and Mulcahy, consulting engineers, 62 Merrion Sq. South, Dublin. Deposit £10 10s.

Mar. 14.—Staffordshire. Electrical repairs at various schools at Bilston, Darlaston, Wednesbury, Wednesfield, and Willenhall. Applications, stating district(s) to Divisional Education Officer, Education Offices, Walsall St., Wednesbury.

Mar. 15.—Durham. Electrical installation at Billingham New Technical College. Applications by above date to G. R. Clayton, County Architect, Court Lane.

Mar. 17.—Eccles T.C. Provision and installation of 77 400 W mercury units comprising concrete columns, lanterns, lamps, condensers, chokes, time-switches, etc., in Worsley and Barton Rds. Borough Engineer and Surveyor, Town Hall.

Mar. 17.—N. Ireland. Supply of electric lamps to Coleraine and Portrush Hospital Management Committee for year beginning April 1. Documents from Secretary of Committee, Bann View Hospital, Coleraine.

Mar. 17.—Hornchurch U.D.C. Provision and installation of ten street lighting columns, lanterns and lamps in Harrow Lodge Park. Engineer and Surveyor, Council Offices, Billet Lane.

Mar. 17.—Tyrone. Electrical installation at County Health Clinic, Cookstown. R. Parke, secretary, County Health Office, Omagh.

Mar. 18.—Aylesbury T.C. Electrical installation in 32 flats on Southcourt and California estate. Architect, Raymond C. White, 4 Temple Square.

Mar. 18.—Dublin. Electrical heating installation at Griffith Barracks. J. Tyrrell, Secretary, Office of Public Works, Dublin. Deposit £1.

Mar. 18.—Manchester. Electrical work in 34 houses on various sites. Director of Housing, Town Hall.

Mar. 19.—Carlisle. Supply and installation of (*a*) 450 Class A concrete columns, and (*b*) fluorescent and mercury street lighting lanterns and control gear. City Engineer, 18 Fisher St. These are separate contracts.

Mar. 19.—Gosforth U.D.C. Provision and erection of 53 Group A and 33 Group B lighting units. Clifford Wyld, Engineer and Surveyor, Council Chambers, High St. Deposit £1 1s.

Mar. 19.—Hull. Electrical installation to Barham secondary modern school on Bilton Grange estate. City Architect, A. Rankine, Guildhall. Deposit £1 1s.

Mar. 19.—Walthamstow B.C. Supply of (*a*) one 30 W a.c. mains amplifier with switch panel to control four microphone circuits; (*b*) three-ribbon high-velocity microphone heads with telescopic stands and 15 yd insulated screened cable; (*c*) two sound columns. W. A. Doig, Deputy Borough Engineer and Surveyor, Town Hall, Forest Rd., E.17.

Mar. 20.—Preston T.C. Electrical installation at Larches county primary school. Borough Engineer and Surveyor, Municipal Building. Deposit £1 1s. (Advertised in this issue.)

Mar. 22.—Kerry. Electrical installation in County Clinic, Tralee. Ed. Ralph Ryan, consulting engineer, 1 Montpellier Terrace, Galway. Deposit £10 10s.

Mar. 22.—Kildare. Supply and installation of two direct drive electrically propelled pumps, including wiring, starters, switches, etc. Consulting Engineer, Nicholas O'Dwyer, 6 Burlington Rd., Dublin. Deposit £5 5s.

Mar. 22.—Bromsgrove U.D.C. Supply of 114 electric cookers and washboilers to Charford Estate. Engineer and Surveyor, Council House.

Mar. 24.—Huddersfield T.C. Supply and erection of electrically driven booster pumping plant at Thongsbridge. Waterworks Engineer, 24 Ramsden St. Deposit £1 1s.

Mar. 24.—Manchester. Installation of electricity required at Rosebank, Mersey Rd. City Architect, Town Hall. Deposit £1 1s.

Mar. 24.—N. of Scotland H.-E. Board. Tenders invited for (*a*) 132 kV steel tower lines approximately 15 miles long from Killin to St. Fillans, and (*b*) 33 kV wood pole lines approximately 20 miles long around St. Fillans and Comrie. Applications by above date to Engineers, Kennedy and Donkin, 12 Caxton St., S.W.1. Deposit £2 2s. (Advertised in this issue.)

Mar. 24.—Romford T.C. Provision and erection of 116 Class A and 289 Class B street lighting concrete columns and lanterns. Borough Engineer and Surveyor, Town Hall. Deposit £2 2s.

Mar. 25.—Skelton and Brotton U.D.C. Wiring and installation of electrical fittings in 22 houses on Wandhill Brosbeck estate. Engineer and Surveyor, Council Offices, Skelton-in-Cleveland. (Advertised in this issue.)

Mar. 31.—Blackpool T.C. Electrical installation in erection of St. Paul's infants school. Applications by above date to Arthur Hamilton, Borough Surveyor, Municipal Buildings.

Mar. 31.—Haslemere U.D.C. Supply and erection of 92 140 W sodium discharge Group A street lights. Engineer and Surveyor, Council Offices.

Mar. 31.—Newark T.C. Supply of (a) 132 concrete columns and four wall brackets, wiring and installation of street lighting, and (b) 400 W mercury lighting equipment along 5,500 yd of trunk roads A1 and A46. Bor-

ough Surveyor, Municipal Buildings, Balderton Gate. Deposit £2 2s. (See Mar. 6 issue.)

Mar. 31.—Warwick T.C. Lighting to Class A standard along (2,730 yd.) Stratford-Warwick trunk road, and along (1,637 yd.) of Emscote Rd. Separate contracts. R. Wormell, Borough Engineer and Surveyor, 20 The Butts.

April 2.—Crompton (Lancs.) U.D.C. Electrical work in erection of 30 houses on three sites. Engineer and Surveyor, Town Hall, Shaw, nr. Oldham.

April 5.—Knaresborough U.D.C. Electrical installation in 62 houses on Meadowside estate. Engineer and Surveyor, Knaresborough House.

April 7.—West Riding. Electrical contractors wanting to tender for lighting, heating and power installations for C.C. should make application for names to be included in lists of selected contractors. County Architect, "Bishopgarth," Westfield Rd., Wakefield. (Advertised in this issue.)

April 9.—Stoke-on-Trent. Supply of necessary electrical installation, including cables, switchgear, etc., for construction of Blithe Valley sewerage scheme. City Sewage Engineer, Leek Road. Deposit £5. (Advertised in this issue.)

No date stated.—N. of Scotland H.-E. Board. Supply and erection of 132 kV double circuit steel-tower overhead lines (about 21 miles), between Rothienorman and Stricken. Same for 26 miles route between Fort Augustus and Glen Truim. These are separate contracts. Merz and McLellan, 39 Northumberland St., Edinburgh. Deposit £2 2s. (Both are advertised in this issue.)

No date stated.—Fort William T.C. Installation of electricity in erection of 20 houses on Claggan site. Applications to Robert Dow, Town Clerk.

No date stated.—Inverness T.C. Electrical work in 40 dwellings on three sites. Burgh Architect, J. Blackburn, 11 High Street.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Horseguards Avenue, S.W.1, quoting reference.*

April 4.—Belgian Congo. Ministry of Colonies, Directorate General Supplies, invites tenders for supply of two 350 kVA generating sets to the Kamina Base. B.o.T. (Ref.: CRE 7397/52).*

April 14.—Portuguese E. Africa. Ports, Railways and Transport Dept., Lourenco Marques invites tenders (No. 26/52) for supply of two electric boring machines, one electric furnace for tempering tools with steel and one revolving lathe. Deposit 11,500 Escudos. B.o.T. (Ref. CRE 7211/52).*

April 15.—India. Supply of high-tension control and metering cubicles for Pykara, Mettur, Paranasam and Madras systems. Superintending Engineer, Technical (Electrical) Dept. of Electricity, Govt. of Madras, 157 Mount Rd., Madras. B.o.T. (Ref. CRE 7753/52).*

April 15.—Uruguay. Supply of apparatus for protecting electric overhead cables from overcharging, including lightning arresters, earth dischargers, and voltage cut-outs. Administracion Nacional de Combustibles, Alcohol y Portland. B.o.T. (Ref. CRE 7259/52).*

April 24.—Uruguay. Ferrocarril Central del Uruguay requires supply of 6,000 dry batteries of 1·5 V for telegraphic and telephonic use, and 3,000 same for use in hand lanterns. B.o.T. (Ref. CRE 7188/52).*

April 25.—Australia. Tenders invited by Victorian Railways Commissioners for supply and installation of communication equipment for operating in underground cable. B.o.T. (Ref. CRE 5377/52).* Closing date postponed from Mar. 26.

No date stated.—India. Kashmir Trade Commissioner in India is anxious to receive, as soon as possible, quotations for supply and construction of three power generating sets and ancillary equipment. The stations will be at Seer, Panchpore and Marbug (altitude 5,200 to 5,400). B.o.T. (Ref.: CRE 8442/52).*

CONTRACTS PLACED

B.E.A. One 60,000 kW turbo-generator, feed heating and condensing plant, Metropolitan-Vickers Elec. Co. Ltd., and 3,300 V switchgear, Brunswick Wharf, English Electric Co. Ltd.; two 60,000 kW turbo-generators, British Thomson-Houston Co. Ltd., and generator transformers, Marchwood, Ferranti Ltd.; condensing plant, Yelland East, G. and J. Weir Ltd.; circulating water screens, Portishead 'B', F. W. Brackett and Co. Ltd.; generator transformer, Castle Donington, Metropolitan-Vickers Electrical Co. Ltd.; ash handling plant, Drakelow, International Combustion Ltd.; one 30,000 kW turbo-generator, feed heating and condensing plant, Northampton, Brush Electrical Engineering Co.; one 60,000 kW turbo-generator, Nottingham,

Your Queries — Answered

"Servac" vacuum cleaners, suppliers of? L.B.—Wholesale Fittings Co. Ltd., 46 Commercial St., E.1. (22283)

"Rouse" fish fryer, makers of? G.E.—John Rouse (Oldham) Ltd., Enterprise Works, Booth St., Oldham. (22291)

"Hovenite" violet ray apparatus, suppliers of? E.B.—R. Hovenden and Sons Ltd., 29 Berners St., W.1. (22298)

"Neora" fittings, suppliers of? T.E.—Neon Rentals Ltd., 168 Victoria St., S.W.1. (22306)

Bakelite 24 gang switch plates, makers of? H.R.—These are made to order by Julius Sax and Co. Ltd., 24 Commerce Rd., Brentford; Fitzgibbon and Murray Ltd., Lower Mill, Kingston Rd., Ewell, Surrey. (22314)

"Syphonit" washer accessory, makers of? N.W.—Labour Saving Devices Co., 50 New Wakefield St., Manchester. (22421)

"Rafflenbeul" shoe press, agents for? G.S.—Pocock Bros. Ltd., 235 Southwark Bridge Rd., S.E.1. (22429)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWER WANTED

Connectors for use on machine tools similar to the Canadian "Marr" (thimble type), makers of? E.L.

Metropolitan-Vickers Electrical Co. Ltd.; condensing and feed heating plant for three 60,000 kw turbo-generator sets, Worthington-Simpson Ltd., and transformers, Hams Hall 'C,' General Electric Co. Ltd.; twelve 150,000 lb/hr boilers, Walsall, Babcock and Wilcox Ltd.; ash and dust handling plant, Connah's Quay, International Combustion Ltd.; two 60,000 kW turbo-generators General Electric Co. Ltd., and 3,300 kW and 415 V auxiliary switchgear, Ince, English Electric Co. Ltd.; one 60,000 kW turbo-generator, feed heating and condensing plant, C. A. Parsons and Co. Ltd., 132 kV generator transformers, Skelton Grange, Hackbridge and Hewittic Elec. Co. Ltd.; one 200,000 lb/hr boiler, Thornhill, Mitchell Engineering Ltd.; lighting, heating and plug point installation, North Tees 'C,' Watson-Norie Ltd.; coal handling plant, Stella South, Robert Dempster and Sons Ltd.; condensing and feed heating plant for two 30,000 kW turbo-generators, Huncoat, Hick Hargreaves and Co. Ltd.

Ramsgate T.C. Conversion of public lighting from gas to electricity along various roads, S.E. Electricity Board, £7,934.

TRADE NOTES

Eeto Insulations, of Bolton, have now completed the erection of new workshops to replace the extensive damage caused by fire last year, and full production has been resumed.

Expansion. The Osram G.E.C. lamp works, Gateshead, which occupy two factories on the Team Valley estate, are to take over a third factory there.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	227 0 0	£220 0 0
LEAD, good soft pig (foreign)	170 0 0	152 0 0
,, ,, ,, "English" quality ...	171 10 0	
TIN (99-99.75%) ... ... (Cash)	982-983	—
,, (3 months)	980-981	—
ALUMINIUM, commercial purity (del.)	148 0 0	—
ZINC	190 0 0	156 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	59 10 0	—
Mild Steel Tape (0·04 in.)	39 15 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Domestic and Commercial Refrigerators Ltd. Meetings of members and creditors will be held at 41 N. John St., Liverpool, on April 19 at 11.30 a.m. and 12 noon resp. to receive liquidators' report.

Duncan Mays Ltd. David Morgan, 100 Park St., W.1., has been appointed liquidator.

Hale Electric Co. Ltd. Petition for winding-up presented on Feb. 4 and directed to be heard before at Royal Courts of Justice, London, on March 17. Interested persons should contact Lucien Fior, 14 Manchester Sq., London W.1.

Harrington Hopkins and Co., electricians of Vernon St., Wolverhampton. Partnership between Roland F. Harrington and John W. Hopkins dissolved as from Feb. 1. Debts received and paid by J. W. Hopkins who will continue business under name of Hopkins and Co.

B. Gibbons and Sons Ltd. Members have appointed William Scott, 64 Cross St., Manchester, as liquidator.

Rae Motors Ltd. Last day for receiving proofs, March 22. Liquidator is H. P. Naunton, Official Receiver, Inveresk House, 346 Strand, W.C.2.

Stelmar Ltd., Meetings of members and creditors will be held at 9 Idol Lane, Eastcheap, E.C.3, on April 4 at 11 a.m. and 11.15 a.m. respectively.

BANKRUPTCY ACTS

Receiving Orders

Banbury. Cecil R. Boydon, electrical engineer of Ivy House, Thorpe Mandeville. Date of order, Feb. 26.

Leominster. Claude D. Weatherhead, electrical engineer trading as Mortimer and Weatherhead at Ludlow. Date of order, Feb. 29.

Intended Dividend

Leeds. Philip H. Leach, radio and electrical engineer trading at 4 Oxford St., Guiseley, and 6 Town St., Yeadon. Last day for receiving proofs, Mar. 21. Trustee is K. Russam, 2a Tyrrel St., Bradford.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Destrol Sales Ltd. To acquire any patents and brevets d'invention, and carry on business of manufacturers of sanitary equipment, electric and oil motors, pumps, etc. Cap.: £1,000. Dirs.: to be appointed by subs. Subs.: S. Kaufman and G. M. Lancum, 72 New Cavendish St., W.1.

Rail Traction Supplies Ltd. Mechanical, electrical, Diesel, consulting and general engineers, iron and steel converters, designers and manufacturers of locomotives, machinery and mechanical equipment, etc. Cap.: £100. Dirs.: to be appointed by subs. Subs.: K. E. Wright and R. A. Clark, 118 Austin Friars, E.C.

Rivlectric Ltd., 6 Clarence Rd., Hunslet, Leeds. Manufacturers of and dealers in electric, gas and oil lamps, etc. Nom. cap.: £1,000. Dirs.: J. N. Somers, M. A. Rivlin and M. Black.

B. W. Swainson Ltd., 465 Barlow Moor Rd., Chorlton-cum-Hardy, Manchester, 21. Electricians, electrical contractors and mechanical engineers, etc. Nom. cap.: £1,000. Dirs.: B. W. Swainson and Mrs. I. Swainson.

Walden (London and Lancashire) Ltd., General, electrical and mechanical engineers, etc. Nom. cap.: £100. Dirs.: not named. Subs.: W. D. Meagher and Doris M. Meagher, 16 St. Thomas Rd., St. Annes-on-Sea.

T. Walters, Ltd., 91 Morley St., Byker, Newcastle-on-Tyne, 6. Electrical engineers and contractors, etc. Nom. cap.: £200. Dirs.: T. Walters, and W. N. Howe.

James Weatherley Ltd., Designers, sellers, manufacturers, importers aud exporters of transport, engineering, mechanical electrical, electronic, marine, scientific,, commercial or industrial machinery. Cap £100. Dir.: J. A. Weatherley 5 Corfton Rd., Ealing, W.5, and K. Stuart, 29 Bakers Mews, W.1.

BUSINESS PROSPECTS

HOME

Aberdeen. Construction of secondary school on Northfield estate at estimated cost of £383,000 has been proposed.

Ashington U.D.C. Plans submitted for approval for 194 houses on the Darnley Rd. estate.

Ballyclare (Antrim). N. Ireland Housing Trust is to build 100 houses at Mill Lane and Doagh Rd. site.

Bolton T.C. Erection of 124 dwellings on Oldhams estate, 18 on Parkfield Rd. estate, and 38 on Hawthorne Rd. estate. Housing Director, Town Hall.

Brighton T.C. Construction of 48 flats on Hollingdean estate. Borough Engineer and Surveyor, 26-30 King's Rd. Also, temporary building is to be erected on basement now occupied by C.I.D. and other Police Depts.

Broadstairs (Kent). It is proposed to build secondary school at estimated cost of £141,000.

Bromley T.C. Erection of 78 and 108 houses on Hayes Place estate. Borough Engineer, Municipal Offices. (Separate tenders invited.)

Cockermouth (Cumb) U.D.C. Tenders expected to be invited shortly for supply and erection of a total of 40 lighting units on various roads. Surveyor is M. M. Dixon, Council Offices, Cockermouth. Negotiations are in hand with N.E. Housing Association for erection of 36 houses at Slatefell. Association is also planning flats in Sullart Street.

Cumberland C.C. is to spend £700 renewing electric wiring at Union Hall, Whitehaven. County Architect is J. H. Haughan, Portland Sq., Carlisle.

Gateshead T.C. Gibson Ready-mixed Concrete Ltd., Gosforth, are to build factory and offices in Hawks Rd. Also, plans approved for extension of Tyneside Safety Glass Ltd.'s factory on the Team Valley estate.

Gillingham (Kent). It is proposed to build Featherby junior school.

Grimsby T.C. Three-storey blocks of flats and maisonettes to be built on Weelsby Rd. and Carr Lane estates.

Guildford T.C. Tenders likely to be invited shortly for erection of 22 houses at Bushy Hill. Approval sought for 550 houses on Park Barn extension.

Harrogate T.C. Erection of 64 houses on Grove House estate. L. H. Clarke, Borough Engineer, Municipal Offices.

Hinckley U.D.C. Construction of 60 houses on three estates. Surveyor, 9 Station Road.

Ilkeston T.C. Erection of 52 dwellings on Kirk Hallam estate. A. O. Marshall, Borough Engineer and Surveyor, Town Hall.

Lanark. C.C. is to build 45 houses at Holytown.

Lancashire. Firswood Catholic secondary school is to be built at Stretford at a cost of about £183,046.

Lewisham B.C. Tenders expected to be invited shortly for erection of 14 houses and 140 flats in Eliot Place.

Llanfyllin T.C. Construction of 26 houses in district. J. Brian Cooper, Coleridge Chambers, 177 Corporation St., Birmingham.

Middlesex. It is proposed to build Prince George Ave., primary school at Southgate and two schools at Staines.

Milnrow U.D.C. Construction of 30 houses on Bentgate St. site. Engineer and Surveyor, Council Offices.

Newquay U.D.C. Plans approved for erection of 56 houses at Doublestiles.

North Shields. Factory extensions covering 10,000 sq ft. proposed for Gregson and Co. Architects are J. Cotton, Ballard and Blow, Haymarket House, Newcastle.

Paisley T.C. Erection of 180 houses on Glenburn development site. Burgh Engineer, J. A. M'Gregor, 14 Gilmour St.

Wandsworth B.C. Planning consent granted for erection of three blocks of (169) flats on Wimbledon Park estate.

Weardale (Dur.) R.D.C. Erection of 21 houses at Wolsingham and 19 at Frosterley. J. Lawton, architect, Council Offices, Stanhope.

Worthing T.C. Erection of 52 houses at Sompting. Engineer and Surveyor, 15 Mill Road.

OVERSEAS

Australia. Noyes Bros. (Melbourne) Ltd., are anxious to represent U.K. manufacturers of transformers. They are interested in complete range of this equipment but possibly with minimum rating of 6·6 kV to 33 kV and from 5 kVA to 1,500 kVA in both single- and three-phase types. Interested firms should write direct to company at 597-603 Lonsdale St., Melbourne C.1.

Italy. Societa per Azioni, "Electrocarbonium," Via Borghetto 5, Milan, want a sole agent for the sale of arc lamps carbons.

S. Rhodesia. J. E. Stone and Co. Ltd., P.O. Box 395, Salisbury, are anxious to obtain agencies for U.K. manufacturers of transformers, steam turbo-alternators, h.t. and l.t. switchgear, motors, transmission materials, cable and cable material except copper sheathed cable, and wires of all kinds.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Altron, with design. 702,200. Class 9. Electronic apparatus and instruments, etc. Allied Electronics Ltd., 28 Upper Richmond Rd., Putney, S.W.15.

Brush Bagnall, with design B702,177. Class 12. Diesel-electric and electric locomotives. Brush Electrical Eng. Co. Ltd., Falcon Works, Loughborough, Leics.

Hyginare. 703,007. Class 10. Apparatus embodying one or more ultra-violet ray lamps. Perihel Ltd., 17 Edge St., W.8.

Orbit. 702,155. Class 11. Electric fans. Veritys Ltd., Plume Works, Plume St., Aston, Birmingham 6.

Magamp. 696,077. Class 9. Apparatus for use in timing processes and for use in controlling machines and motors. English Electric Co. Ltd., Queens House, 28 Kingsway, W.C.2.

Red Rose Cathoweld, with design 701,224. Class 9. Portable electric appliances, etc. G. K. Lancaster (London) Ltd., 50 George St., Croydon.

Welcolite. 700,003. Class 7. Electricity generator sets driven by an internal combustion engine. Welland Eng. Co. Ltd., Water Lane, Spalding, Lincs.

MEETINGS TO NOTE

THURSDAY, MAR. 13

INCORP. PLANT ENGRS. (Kent Branch).—"Illumination and Factory Lighting." Queens Head Hotel, Maidstone, 7 p.m.

BRITISH INSTN. OF RADIO ENGRS. (Scottish Section).—"Radar as an Aid to Navigation." N. J. Donald. The University, Drummond St., Edinburgh, 7 p.m.

ENGRS'. GUILD.—Discussion on "Problem of the Over-40s." L. N. Duguid, dep. chief inspector of factories. Caxton Hall, London, S.W.1, 6 p.m.

INSTN. OF WORKS MANAGERS (Wembley Sub-branch).—"Aspects of Management." H. O. Weare, of G.E.C. Lamp Works. "The Plough," Kenton, 12.30 p.m.

E.P.E.A. (Merseyside Tech. Group).—"Centralised Control—Automatic Boiler Control." J. S. Holt. Elect. Showrooms, Whitechapel, Liverpool, 7 p.m.

I.E.E. (London).—"Electronic Telephone Exchanges." T. H. Flowers. Savoy Place, London, W.C.2, 5.30 p.m.

I.E.S. (Leicester Centre).—"Sports Lighting." M. W. Peirce. Elect. Offices, Charles St., 6.30 p.m.

I.E.E. (N. Midland Centre).—Faraday Lecture on "Sound Recording—Home, Professional, Industrial and Scientific Applications." G. F. Dutton. Town Hall, Leeds, 7 p.m.

I.E.S. (Manchester Centre).—"Performance of Vehicle Headlights on the Road." A. G. Harris. Town Hall Extension, 6 p.m.

FRIDAY, MAR. 14

BRITISH REFRIGERATION ASSOC.—Luncheon at Connaught Rooms, London, at 12.45 p.m.

BRITISH INSTN. OF RADIO ENGRS. (Scottish Section).—"Future of Broadcasting." Paul Adorian. 39 Elmbank Cres., Glasgow, 7 p.m.

I.E.E. (N. Staffs Sub-centre).—Annual dinner at Royal Oak Hotel, Stafford, 7 p.m.

I.E.S. (Birmingham Centre).—Annual meeting. "Physical Principles Governing Fittings Design." W. H. Willott. Imperial Hotel, 6 p.m.

INSTN. OF MECH. ENGRS.—"Basic Engineering Standards and Their Place in Design." Capt. C. G. Adams. Storey's Gate, London, S.W.1, 5.30 p.m.

A.S.E.E. (Crewe Branch).—"Factory Electrical Maintenance." C. Maddocks. Crewe Arms Hotel, 7.30 p.m.

A.S.E.E. (Liverpool Branch).—"Cathode Ray Oscillograph as a Tool." R. C. Turnock. Laboratories of Applied Electricity, Liverpool University, 7.30 p.m.

A.S.E.E. (Nottingham Branch).—"Auto Electrical Equipment." F. Bull. Elect. Showrooms, Smithy Row, 7.30 p.m.

ELECTRICAL TRADES COMMERCIAL TRAVELLERS' ASSOCIATION.—General meeting at Feathers Hotel, Broadway, S.W.1, 6 p.m.

SATURDAY, MAR. 15

A.S.E.E. (Oxford Branch).—"Television." S.E.B., George St., 3 p.m.

MONDAY, MAR. 17

E.P.E.A.—"Commissioning Power House Plant." Caxton Hall, S.W.1, 7 p.m.

BIRMINGHAM ELECTRIC CLUB.—"Development of Load on Electricity Supply System." J. R. Anderson. Grand Hotel.

I.E.E. (Mersey and N. Wales Centre).—Faraday Lecture on "Sound Recording—Home, Professional, Industrial and Scientific Applications." G. F. Dutton. Philharmonic Hall, Liverpool, 6.45 p.m.

I.E.S. (Sheffield Centre).—"Colour." W. J. Wellwood Ferguson. The University, Western Bank, 6.30 p.m.

TUESDAY, MAR. 18

INST. OF FUEL.—"Fuel—Heat and Power Auditing." L. Clegg and J. Price Walters. Inst. of Mech. Engrs., Storey's Gate, S.W.1, 5.30 p.m.

DUMFRIES AND GALLOWAY ELECTRICAL SOC.—"Television." R. T. Frost. Ewart Library, Dumfries, 7.30 p.m.

A.S.E.E. (London).—"Statistical Methods as Aids to Efficiency." Dr. B. P. Dudding. L.S.B., Savoy Hill, W.C.2, 6.30 p.m.

INSTN. OF WORKS MANAGERS (Leicester Branch).—"Lamps and Lighting—Record of Industrial Research." R. V. Mills. At B.T.H., Rugby.

I.E.E. (London Measurements and Supply Sections).—"Application of Transductors as Relays to Protective Gear." R. K. Edgley and F. L. Hamilton. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (E. Midland Centre).—"Logical Approach to the Problems of Electric Space-Warming." D. H. Parry. Gas Showrooms, Nottingham, 6.30 p.m.

I.E.E. (N. Midland Utilisation Group).—"Characteristics and Control of Rectifier-Motor Variable-Speed Drives." P. Bingley. 24 Aire St., Leeds, 6.30 p.m.

I.E.E. (N.W. Measurements Group).—"Survey of Modern Methods of Presentation of Instrument Readings and Recordings." L. B. S. Golds. Engrs'. Club, Albert Sq., Manchester, 6.15 p.m.

I.E.E. (S. Midland Students' Section).—"Switchgear." L. Drucquer. Association Hall, English Electric Co., Stafford, 7.30 p.m.

WEDNESDAY, MAR. 19

A.S.E.E. (Coventry Branch).—"Estimating." W. H. Brooks. Coventry Technical College, 7.15 p.m.

A.S.E.E. (Manchester Branch).—Film show at Engineers' Club, Albert Sq., 7.30 p.m.

BRITISH INSTN. OF RADIO ENGRS. (S. Midlands Section).—"Application of Magnetic Amplifiers to Industrial Measurement and Control." H. M. Gale. Public Library, Rugby, 7.15 p.m.

I.E.E. (London Students' Section).—"Industrial Electronics." R. A. Jones. Savoy Place, W.C.2, 6.30 p.m.

ROYAL SOC. OF ARTS.—"Supplementary Sources of Power—Wind, Tide, Sun and Volcanic Heat." C. W. Marshall. John Adam St., W.C.2, 2.30 p.m.

I.E.E. (Sheffield Sub-centre).—"Protection of Electrical Power Systems—Critical Review of Present-day Progress and Recent Progress." H. Leyburn and C. H. W. Lackey. Grand Hotel, 6.30 p.m.

I.E.E. (Southern Centre).—"Dimming of Low-Pressure Discharge Lamps." C. E. Williams. Grand Hotel, Bournemouth, 6.30 p.m.

INST. OF FUEL (N.W. Section).—Discussion on "Research into Steam and Heat Utilisation in Industry." Dr. E. G. Ritchie. Engrs'. Club, Manchester, 6.30 p.m.

INST. OF FUEL (Yorks Section).—"Relations Between Atomic Energy Developments and Fuel Industries." J. M. Hutcheon. The University, Leeds, 6.30 p.m.

THURSDAY, MAR. 20

ENGINEERS' GUILD (Northern Branch). "The Tyne Tunnel." Sir David Anderson. County Hotel, Neville St., Newcastle, 5.45 p.m.

ELECT. WHOLESALERS FEDERATION.—Annual dinner at Savoy Hotel.

E.P.E.A. (Midland Tech. Group).—"Electric Motor Construction and Industrial Application."

I.E.E. (London Utilisation Section).—"Individual-Generator System as Applied to Tandem Cold-Strip Mill," D. Bolton; "Magnetic Fluid Clutch," E. J. R. Hardy; "Measurement of Electrical Activity in Human Body," J. C. Shaw. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (N. Ireland Centre).—Faraday Lecture, "Sound Recording—Home, Professional, Industrial and Scientific Applications." Sir William Whitla Hall, Belfast.

I.E.E. (Irish Branch).—"Modulation—Some Fundamental Considerations." T. P. Allen. Trinity College, Dublin, 6 p.m.

I.E.S. (Glasgow Centre).—Annual meeting. Presidential address by J. G. Holmes, and annual dinner.

I.E.S. (Bradford Group).—"Black Light, Its Effect and Application." H. L. Privett. Y.E.B., 45/53 Sunbridge Rd., 7.30 p.m.

FRIDAY, MAR. 21

I.E.E. (N. Midland Centre).—Annual dinner dance at Majestic Hotel, Harrogate, 7 p.m.

I.E.E. (Scottish Centre).—Dinner at North British Hotel, Edinburgh.

I.E.S. (Edinburgh Centre).—Annual dinner and social. Visit by President.

I.E.S. (Nottingham Centre).—Annual ladies' evening at Victoria Station Hotel.

INSTN. OF MECH. ENGRS.—"Centrifugal Pumps in Steam Power Stations." R. Pennington. Storey's Gate, S.W.1, 5.30 p.m.

GRASSHOPPER INN

Moorhouse, Near Westerham

Mr. Newman, the proprietor, has every reason to be proud of the "Grasshopper" which he has created from an old country pub.

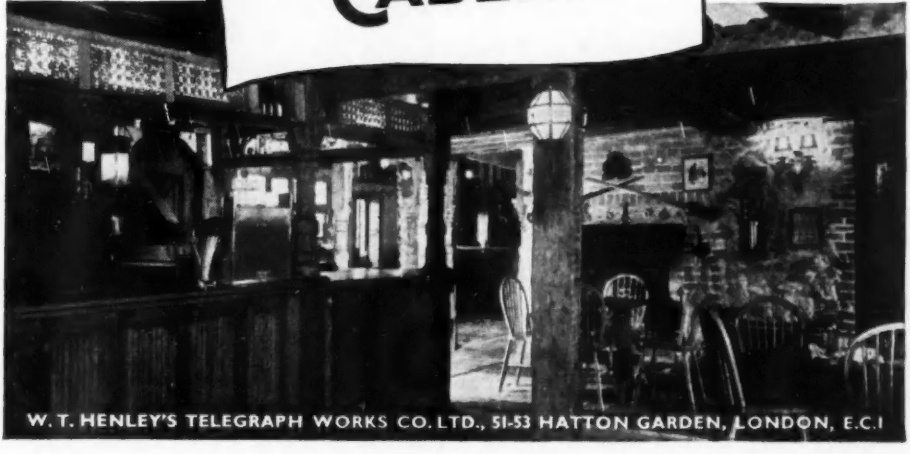
The wiring presented no problems, for as Mr. Newman pointed out, the Henley Wiring System was ideal for the job, being unobtrusive and easy to install.

The complete installation was carried out by the South Eastern Electricity Board, Sevenoaks and Horley District (Oxted Depot).

wired throughout with

HENLEY CABLES

BY APPOINTMENT ELECTRIC CABLE MANUFACTURERS



W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

WESTON

Electrical Measuring Instruments

No. 7 Miniature Panel Instruments

The range of Weston panel instruments includes DC moving coil, AC rectifier and HF thermocouple types and instruments of the moving iron type. They are available in case diameters of 2", 2½" and 3½". Spring-loaded jewels protect the pivots from even the most severe shocks. Full details of these instruments will gladly be supplied on request together with information on the full Weston range, which includes switchboard, portable, sub-standard and laboratory standard instruments.

SANGAMO WESTON LIMITED

Enfield, Middlesex. Tel: Enfield 3434 (6 lines) & 1242 (4 lines). Grams: Sanwest, Enfield

Branches: Glasgow, Manchester, Newcastle-on-Tyne, Leeds, Liverpool, Wolverhampton, Nottingham, Bristol, Southampton, Brighton

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

CITY OF STOKE-ON-TRENT

Sewage Purification Department

BLITHE VALLEY SEWERAGE AND SEWAGE PURIFICATION SCHEME

CONTRACT No. 70(E)

SEWAGE PURIFICATION WORKS ELECTRICAL INSTALLATION

THE CITY COUNCIL invites tenders from contractors who are members of the National Federated Electrical Association or are on the National Register of Electrical Installation Contractors, for the supply of the necessary electrical installation, including CABLES, SWITCHGEAR and OTHER EQUIPMENT and labour in LAYING and FIXING, required in connection with the construction of the above works.

Specification and form of tender may be obtained at the office of the City Sewage Engineer, Leek Road, Stoke-on-Trent, on payment of a deposit of £5 in treasury notes (which will be returned on receipt of a bona-fide tender).

Neither the lowest nor any tender will necessarily be accepted.

The successful contractor will be required to conform to the standing orders of the council relating to contracts.

Tenders, in plain, sealed envelopes endorsed "Electrical Installation—Blithe Valley Sewage Works" are to reach the undersigned not later than first post on Wednesday, April 9, 1952.

HARRY TAYLOR,
Town Clerk.

Town Hall, Stoke-on-Trent. (R 353)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

TRANSMISSION LINES IN PERTHSHIRE

TENDERS are invited for the following overhead line works:—

1. 132 kV STEEL TOWER LINES approximately 15 miles route length from Killin to St. Fillans (Contract No. C66BLT 1(a)).
2. 33 kV WOOD POLE LINES approximately 20 miles route length in the vicinity of St. Fillans and Comrie (Contract No. C66BLT 6).

Tender documents may be obtained on application not later than March 24, 1952, to the Engineers, Messrs. Kennedy and Donkin, 12 Caxton Street, London S.W.1. Applications should be accompanied by cheque for two guineas deposit (returnable) for each contract. Tenderers may apply for either or both tender documents.

The Board do not bind themselves to accept the lowest or any tender.

W. D. D. FENTON,
Secretary.

16 Rothesay Terrace, Ed:nburgh 3.
March 3, 1952. (R 305)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

132 kV OVERHEAD TRANSMISSION LINES

TENDERS are invited for the SUPPLY, DELIVERY and ERECTION OF 132 kV DOUBLE-CIRCUIT STEEL-TOWER OVERHEAD LINES, approximately 26 miles route length, between Fort Augustus and Glen Truim in the County of Inverness.

Copies of the tender document may be obtained on application to the Engineers, Messrs. Merz and McLellan, 39 Northumberland Street, Edinburgh 3. Applications should be accompanied by a cheque for £2 2s. (returnable).

The Board do not bind themselves to accept the lowest or any tender.

W. D. D. FENTON,
Secretary.

16 Rothesay Terrace, Edinburgh 3.
March 7, 1952. (R 355)

COUNTY COUNCIL OF THE WEST RIDING OF YORKSHIRE

TO ELECTRICAL INSTALLATION CONTRACTORS

ELECTRICAL INSTALLATION CONTRACTORS desirous of tendering for ELECTRIC LIGHTING, HEATING and POWER INSTALLATIONS for the County Council should make application for their names to be included on the County Council's lists of selected contractors.

Projects will be classified into the under-mentioned categories and applicants for inclusion on the lists should state the category or categories of work for which they wish to be considered:—

(*a*) Works of a value between £10,000 and £25,000.
(*b*) Works of a value between £25,000 and £50,000.
(*c*) Works of a value between £50,000 and £100,000.
(*d*) Works of a value over £100,000.

All applications for inclusion on the County Council's lists of selected contractors should give particulars of works of a similar nature which have been carried out by the applicant, together with the names and addresses of three architects or engineers to whom reference can be made and the name and address of the applicant's banker

Applications to be sent in writing to the County Architect, Bishopgarth, Westfield Road, Wakefield, not later than 10 a.m. on Monday, April 7, 1952.

BERNARD KENYON,
Clerk of the County Council.

County Hall, Wakefield.
March 6, 1952. (R 352)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

132 kV OVERHEAD LINES

TENDERS are invited for the SUPPLY, DELIVERY and ERECTION OF 132 kV DOUBLE-CIRCUIT STEEL-TOWER OVERHEAD LINES, approximately 21 miles route length, between Rothienorman and Strichen, Aberdeenshire.

Copies of the tender document may be obtained on application to the Engineers, Messrs. Merz and McLellan, 39 Northumberland Street, Edinburgh 3. Applications should be accompanied by a cheque for £2 2s. (returnable).

The Board do not bind themselves to accept the lowest or any tender.

W. D. D. FENTON,
Secretary.

16 Rothesay Terrace, Edinburgh 3.
March 7, 1952. (R 356)

COUNTY BOROUGH OF PRESTON

Education Committee

ELECTRICAL INSTALLATION
LARCHES COUNTY PRIMARY SCHOOL

ELECTRICAL contractors are invited to tender for the ELECTRICAL INSTALLATION at the above new school, situated at Larches Estate, Preston.

Contractors desirous of tendering should submit their application to the Borough Engineer and Surveyor, with a deposit of £1 1s. (payable to "Preston Corporation", before March 20, 1952.

W. E. E. LOCKLEY,
Town Clerk.

Municipal Building, Preston. (R 354)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

TENDERS are invited for two BOILERS now at Lydney Power Station, Glos., REQUIRING DISMANTLEMENT AND REMOVAL. Tender forms may be obtained from the Divisional Secretary, British Electricity Authority, Cardiff (Pengam Moors) Airport, Cardiff, and must be returned by 10 a.m. on Wednesday, April 9, 1952.

Inspection by arrangement with Station Superintendent, Lydney Power Station, Lydney, Glos. (Lydney 303). (R 351)

SKELTON AND BROTTON URBAN DISTRICT COUNCIL

TENDERS FOR ELECTRICAL WIRING, ETC.

THE COUNCIL invite tenders for the ELECTRICAL WIRING AND INSTALLATION OF ELECTRICAL FITTINGS in respect of 22 houses on their Wandhill Boosbeck Estate.

Plans may be inspected and specification and form of tender obtained at the office of the Engineer and Surveyor, Council Offices, Skelton-in-Cleveland.

Tenders enclosed in plain sealed envelopes endorsed "Electrical Installations" must be delivered to the undersigned not later than 10 a.m. on Tuesday, March 25, 1952.

The Council do not bind themselves to accept the lowest or any tender.

F. WILKINSON,
Clerk of the Council.

Council Offices, Skelton-in-Cleveland.
March 11, 1952. (R 357)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for:—

Vacancy No. 689

SHIFT CHARGE ENGINEER at Generating Station, Leigh, Lancs. Salary £539/£566 (N.J.B. B7).

Vacancy No. 690

ASSISTANT SHIFT CHARGE ENGINEER at Westwood Generating Station, Wigan, Lancs. Salary £621/£648 (N.J.B. G9).

Apply to Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, before March 22, quoting vacancy No. (R 339)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

Northmet Sub-Area

(Tottenham, Hertford, Southgate & Wood Green Districts)

GENERAL ASSISTANT ENGINEERS

Candidates should have had a sound training in Electrical Engineering and experience of the construction, operation and maintenance of underground and overhead systems up to 33 kV.

The salary for the appointment will be in accordance with the N.J.B. Salary Agreement Grade 11, plus London Weighting in Tottenham and Southgate and Wood Green Districts Class "E" and "F" respectively, Hertford will be Class "E".

Applications should be submitted to the District Managers concerned at the following addresses.

Tottenham—312 High Road, Tottenham, London, N.15.
Hertford—Bridgefoot, Ware, Herts.
Southgate and Wood Green—13/27 Station Road, London, N.22, within 14 days of the appearance of this advertisement. (125 and 128/51R and 11/52R.)

Suffolk Sub-Area

(Clacton District)

DEMONSTRATOR

Applicants should have had Domestic Science training including electrical housecraft and should preferably hold the E.A.W. Certificate. They should be competent to plan and give cooking demonstrations, including lectures and advice to consumers on the utilisation of domestic electrical appliances. Previous experience in an Electricity Service Centre is desirable.

The salary will be in accordance with N.J.C. Salary Agreement Grade 1 (£360 p.a. by £20- £440 p.a. by £10- £450). Progress beyond £400 p.a. will be subject to a certificate that the person concerned is capable of undertaking all the duties of the grade.

Applications in writing, stating age, qualifications, experience and details of present employment should be addressed to the District Manager, Clacton, Eastern Electricity Board, 56/58 Station Road, Clacton, Essex, within 14 days of the appearance of this advertisement. (12/52R.)

Both future salaries and conditions of service for these appointments will be in accordance with agreement made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination. (R 340)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following superannuable posts:—

27/52 1st ASSISTANT CHEMIST (Derby)

Candidates should preferably possess the Higher National Certificate in Chemistry or its equivalent and should have had practical experience in the analysis of coal, water and oil, etc, insofar as they concern Power Stations.

The salary for the above appointment will be in accordance with Grade 9, Class "F" (£587-£609 p.a. of the N.J.B. Agreement.

28/52 CIVIL ENGINEERING DRAUGHTSMEN

Candidates should preferably have had experience in:—

(a) design and detail of steel frame buildings, bridge and gantries, etc., or
(b) design and detail of R.C. Structures, piled and slab foundations for heavy plant, culverts, cable subways, etc., or
(c) general Building construction, drainage and sanitation schemes, associated with offices and administrative buildings.

29/52 MECHANICAL ENGINEERING DRAUGHTSMEN

Candidates should have had experience in the layout of boiler and turbine auxiliaries, condensing plant, coal and ash-handling plant, H.P. and L.P. pipework installations.

30/52 ELECTRICAL DRAUGHTSMEN

Candidates should have had experience in the layout and installation of E.H.T. and L.T. switchgear, transformers, E.H.T. and L.T. cabling.

The salary for the above appointments will be within Grade 5 (£547-£651 p.a.) or Grade 6 (£413-£547 p.a.) according to experience and qualifications.

Applications should be submitted on the official forms which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned not later than April 7, 1952. Please state Vacancy Number.

L. F. JEFFREY
Divisional Controller.

March 7, 1952. (R 341)

THE BRITISH IRON AND STEEL RESEARCH ASSOCIATION

ELECTRICAL ENGINEERS required by the Plant Engineering Division of the above Association to carry out applied research in the iron and steel industry. Honours Degree in Electrical Engineering essential. Experience in either heavy electrical engineering control problems and servo mechanisms or in electronics very desirable. Age range 26 to 34. Starting salary according to age, qualifications and experience, within the range £600 to £800 per annum. Post is superannuated under the F.S.S.U. Location of work, London.

Written applications only, to Personnel Officer, B.I.S.R.A., 11 Park Lane, London W.1. (R 244)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable positions. Salaries and conditions of service are in accordance with N.J.B. Schedule "A" and inclusive of London Allowance.

ASSISTANT ENGINEER (MAINTENANCE)
Shoreditch Generating Station

Duties will be to generally assist Power Station Superintendent in maintenance, supervision and programming and in preparation of statistics, records and plant inspection schedules.

Salary—Class "E." Grade II—£529 4s. p.a.

ASSISTANT ENGINEER (TECHNICAL)
Walthamstow Generating Station

Duties include preparation of statistics, records and plant inspection, together with programming maintenance overhauls, of plant and switchgear.

Salary—Class "D." Grade 11—£505 p.a.

STATION SHIFT CONTROL ENGINEER
West Ham Generating Station

Good technical qualifications up to Higher National Certificate standard, or equivalent required with sound technical training and practical experience in control and operation of steam generating plant and main switchgear in modern generating station.

Salary—Class "G." Grade 10—£617 8s. p.a.

Applications stating age, qualifications and experience should be addressed to Division Secretary, British Electricity Authority, London Division, Ergon House, S.W.1, and be received within fourteen days of appearance of this advertisement.

Pending clarification of exempted grades all applicants for the above positions from OUTSIDE THE ELECTRICITY SUPPLY INDUSTRY should make their application to their local Ministry of Labour and National Service Exchange to comply with The Notification of Vacancies Order 1952.

H. V. PUGH,
Divisional Controller.
(R 343)

LONDON ELECTRICITY BOARD

ENGINEER (OPERATION & MAINTENANCE)

APPLICATIONS are invited for the above position in the Willesden District of the North Western Sub-Area.

Applicants should be Corporate Members of the I.E.E. or hold equivalent qualifications and should have had extensive experience in system operation, load control, installation maintenance and fault location of 3-phase a.c. systems up to 11 kV and 3-wire d.c. systems, and the control of manual employees.

The post is graded under Schedule A of the National Joint Board agreement as Class "F," Grade 7—£710 17s. 0d. per annum rising to £730 16s. 0d. per annum, inclusive of London allowance.

Application forms, obtainable from Establishments Officer, 46 New Broad St., E.C.2, to be returned duly completed by March 28, 1952. Please enclose addressed foolscap envelope and quote ref. V/1354/T on all correspondence. (R 338)

NORTHAMPTON POLYTECHNIC

St. John Street, E.C.1

APPLICATIONS are invited for vacancy on full-time LECTURING STAFF of the Electrical Engineering Department.

Candidates should possess a university degree in engineering or equivalent qualification, and have had practical experience in the electrical industry.

Salary in accordance with the London Technical Burnham Scale, Grade B, viz. £450 by £25 to £725 with allowance of £80 for graduates or equivalent and up to £54 for training, plus London allowance of £36 (£48 if over 37).

Particulars and form of application from Secretary.

J. E. RICHARDSON, Ph.D., B.Eng., M.I.E.E.,
Principal.
(R 306)

NORTH WESTERN ELECTRICITY BOARD

No. 6 Sub-Area

APPOINTMENT OF THIRD ASSISTANT ENGINEER, Sub Area Technical Engineer's Department, Kendal

APPLICANTS should have had experience as Clerk of Works with thorough knowledge of all sections of the building trade, be capable of setting out, giving levels, measuring up, keeping all necessary site records and rendering reports. Maintenance and repair of Board's property will be included in duties.

Salary scale: £621 to £648 p.a, Grade H.10. N.J.B. conditions.

Applications to Sub-Area Manager, No. 6 (Lakeland) Sub-Area, The North Western Electricity Board, Castle Green, Kendal, by March 22, 1952. (R 307)

CROWN AGENTS FOR THE COLONIES

QUALIFIED CANDIDATES are invited to apply for the following posts:—

TELECOMMUNICATIONS ENGINEER (M.28792.B) required by Government of Nyasaland for the Posts and Telegraphs Department for one tour of 24 to 36 months. Commencing salary according to age and experience in scale £770, rising to £1,304 a year (including cost of living allowance). Outfit allowance £50. Free passages. Liberal leave on full salary. Candidates must have a sound practical and theoretical knowledge of internal and external telecommunications engineering and be capable of supervising the installation of v.h.f. radio equipment; automatic telephone exchanges and switchboards; subscribers' installations; trunk line and subscribers' line construction; installation of carrier equipment, various types, v.f. and d.c. telegraphic equipment. Applicants who are on the staff of the General Post Office should submit their applications through official channels.

ELECTRICAL DRAUGHTSMAN (M.29166.B) required by the Government of Kenya for one tour of four years in the first instance. Salary, according to qualifications and experience, in scale £670, rising to £840 a year, plus a temporary allowance between £106 and £114 a year according to salary. Free passages and liberal leave on full salary. Gratuity payable on satisfactory completion of service. Outfit allowance £30. Candidates, not over 32 years, must have been trained in a drawing office, have a sound knowledge of the Institution of Electrical Engineers Regulations, and be capable of preparing layout drawings, under the general supervision of a senior engineer, of electrical installations in both multi-storey and single-storey domestic and industrial premises and public buildings. They must be capable of supervising a small drawing office staff.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting on letter the reference number shown against the post for which application is made. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (R 321)

UGANDA ELECTRICITY BOARD

APPLICATIONS are invited for the appointment of DISTRICT ENGINEER. Applicants should have had a sound technical training and experience in planning, construction, operation and maintenance of overhead networks and substations up to 33 kV. Experience with higher voltages will be an advantage.

Corporate Membership of the Institution of Electrical Engineers or equivalent qualification is desirable.

Salary scale £960 by £40 to £1,100 per annum, plus temporary cost-of-living allowance of 20% (maximum £200 p.a.). Commencing salary according to experience and qualifications. Free, partly furnished accommodation provided or allowance paid in lieu. Three-year contract in first instance with free passage to and from Uganda. Leave on full pay at end of contract.

Application forms and further information may be obtained from the Board's London Office, 129 Grand Buildings, Trafalgar Square, W.C.2. Applications to reach Board's London Office by March 27, 1952.

C. R. WESTLAKE,
Chairman.

P.O. Box 559, Kampala,
Uganda, East Africa. (R 245)

AIR MINISTRY

AIR MINISTRY require MECHANICAL and ELECTRICAL ENGINEERS for duty in their Works Department in connection with the design, operation and maintenance of ground mechanical and electrical works services on R.A.F. stations at home and overseas and on civil aviation stations. Appointments will be in two grades with a salary of (1) £600 to £900 (D 19/48/A), or (2) £900 to £1,200 (D 370/50/A) respectively. Provincial rates are somewhat lower. Commencing salary will be in accordance with age, qualifications and experience. A special allowance of up to £800 a year is payable in addition to salary during overseas service. Candidates must be natural born British subjects. The minimum qualifications and experience required for both grades of post are: (1) (a) University degree or equivalent diploma in electrical and/or mechanical engineering and have had at least a two-year apprenticeship, or (b) Graduate or Corporate Membership of the Institution of Electrical Engineers, or of the Institution of Mechanical Engineers, with appreciable electrical engineering experience, and have served at least a three year apprenticeship, and (ii) have been employed in a responsible position for a minimum of three years with a well-established engineering concern, and there have gained wide experience in electrical and mechanical engineering practice.

Application forms from Ministry of Labour and National Service, Technical and Scientific Register (K), Almack House, 26 King Street, London S.W.1, quoting D 19/48-A or D 370/50-A. (P 654)

A LARGE Electrical Manufacturing Concern with an expanding programme of important work requires additional staff in Production Departments. First an unusually promising opportunity occurs for an experienced and qualified PRODUCTION ENGINEER to act as Assistant to Head of Department. Assistance given toward purchase of house. Also an ASSISTANT is required in a smaller Production Department to work on planning methods and general production problems concerned with medium and heavy electrical engineering products. This is a good opening for a senior jig and tool draughtsman who wishes to combine his present duties with engineering methods. Location Southern England. Own staff aware of these vacancies.—Applications, with full details, to Box No. 1553, Electrical Times. (R 310)

APPLICATIONS are invited for the position of ASSISTANT to the Technical Officer of the Water-Tube Boilermakers' Association. Candidates should be in possession of a good Honours Degree in Mechanical Engineering and should be Graduate or Corporate Members of one of the leading Institutions. Previous practical experience in the design and operation of boiler plant necessary, also some experience of research and development. Salary £900 per annum for first year of appointment with prospect of subsequent advancement. —Write, giving full details of qualifications and experience, to The Director, The Water-Tube Boilermakers' Association, 8 Waterloo Place, Pall Mall, S.W.1. (R 249)

ASSISTANT ENGINEERS FOR LIGHTING DEVELOPMENT. Assistants with a sound technical education in either electrical engineering or physics are required for lighting development and educational work. Applicants should possess a degree or qualifications required for Corporate Membership of the I.E.E. The appointment involves both public speaking and the ability to write on technical matters.—Applications, stating age, qualifications and experience, should be sent to The E.L.M.A. Lighting Service Bureau, 2 Savoy Hill, London W.C.2. (R 322)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

ASSISTANT for Rubber Cable Export Sales Department. Write in confidence stating qualifications, experience and salary required to: Cable Dept., Edison Swan Electric Co. Ltd., 155 Charing Cross Road, London, W.C.2. (R 346)

ASSISTANT PLANT ENGINEER, preferably a qualified mechanical draughtsman, required by W. T. Henley's Telegraph Works Co. Ltd. for their works in Birtley, Co. Durham. Salary: £500-£600 per annum.—Apply, stating age, qualifications and experience, to any Employment Exchange. (R 327)

ASSISTANT SECTION ENGINEER (2), Merseyside and North Wales Electricity Board, Birkenhead District. Salary: £528-£545 p.a. (N.J.B. F/11). Applicants should be Graduates of the Institution of Electrical Engineers or possess the Higher National Certificate in Electrical Engineering. Preference will be given to candidates with some experience of h.t. and l.t. overhead and underground distribution. The appointment is superannuable and subject to medical examination.—Application forms from the Manager, MANWEB No. 3 Sub-Area, Electricity House, Newgate Street, Chester. Closing date March 24, 1952. (R 323)

ASSISTANT TECHNICAL SECRETARY wanted for committees dealing with electric transmission and utilization studies. Preferably Grad. I.E.E. with some experience in electrical industry. Starting salary £400-£500 p.a. according to age and qualifications.—Apply to the Director, Electrical Research Association, 5 Wadsworth Road, Greenford, Middlesex. (R 301)

BRITISH ELECTRICITY AUTHORITY, Merseyside and North Wales Division, require STATION CHEMIST for Percival Lane power station, Runcorn. Salary: £704-£733, Class "G," Grade 7, N.J.B. Schedule A. A knowledge of fuel testing, water analysis, oil testing or metallurgy will be an advantage. Possession of university degree, A.R.I.C. or equivalent qualification desirable.—Application forms from Divisional Secretary, Clarke Gardens, Woolton, Liverpool. Closing date March 28, 1952. (R 324)

BRITISH ELECTRICITY AUTHORITY require a SPECIFICATIONS AND CONTRACTS ENGINEER responsible to the Deputy Chief Engineer (generation construction), for organising and controlling the work of the Specifications and Contracts Branch in the Chief Engineer's department, which is concerned with the engineering aspects of settlement of claims; critical examination of tenders; negotiations with trade associations and contractors; price adjustments under standard conditions of contract and the placing of contracts for plant, building and civil engineering works. Salary within provisional range £1,750-£2,000 p.a. (Contributory superannuation.)

Candidates should be corporate members of the I.E.E., I.Mech.E., or Inst.C.E., and must have wide and up-to-date engineering and commercial experience in handling major power station contracts, including procedure.

Letters of application, stating age, qualifications, experience, present position and salary to D. Moffat, Director of Establishments, British Electricity House, 170 Great Portland Street, London, W.1, to be returned by April 2, 1952. Quote reference AE.202. Previous candidates need not re-apply. (R 342)

DRAUGHTSMAN required for switchgear development work. Good salary offered to suitable applicant. Pension Scheme available.—Reply, stating age, salary, and full details of technical qualifications and experience to Erskine, Heap and Co., Ltd., Lancashire Switchgear Works, Salford, Manchester 7. (R 262)

E.L.F.A. MEMBER requires SALES ENGINEER for the Midlands area to be attached to the Technical Department. Details of training and experience to be stated on application. Applicants without previous experience, but with sound electrical knowledge and willing to be trained, will be considered.—Write, Box 96, Allardyce Palmer, Ltd., 109 Kingsway, W.C.2. (R 308)

ELECTRICAL DRAUGHTSMAN required. Diagrams and general layouts, also cable runs similar to power station work.—State age, salary required—according to experience, to Box No. 1565, Electrical Times. (R 330)

ELECTRICIAN for large British engineering firm in the Sudan. Good practical experience capable initially of supervising unskilled native labour in the field in erection of overhead transmission lines, internal house wiring, etc., and of developing into full electrical engineer; excellent prospects for keen progressive man. Age 25-28, must be unmarried and physically fit. Commencing salary equivalent to £640 per annum, including accommodation, with annual increments. Provident scheme, good leave with free passages. There is no income tax. Good references essential.—Apply, with copy references and full particulars, to Box No. 1559, Electrical Times. (R 326)

ENGINEER of degree standard, B.Sc.(Eng.) desirable, required for design and development of power capacitors. Should have knowledge of dielectrics and measurements.—Apply: Box No. 1575, Electrical Times. (R 364)

ENGINEER, technically qualified and experienced in the design of supertension paper cables, required for permanent senior staff appointment.—Applications should be fully detailed and clearly marked "Engineer."—Aberdare Cables, Ltd., Aberdare, Glamorgan. (R 311)

FALKS require EXPERIENCED DESIGNERS for their Birmingham Works where they manufacture a complete range of Industrial and Domestic Electrical Accessories, viz.: Switches, Switch plugs, etc. Knowledge of Modern a.c. switch practice up to 60 amps necessary with experience of latest developments. Excellent prospects carrying adequate salary and pension.—Reply with details of experience to Falks, A. Dept. 91, Farringdon Rd., London, E.C.1. (R 345)

FIRST ASSISTANT DISTRICT ENGINEER (Senior Section Engineer), Merseyside and North Wales Electricity Board (Anglesey District). Salary £699-£713 (N.J.B. C/4).

Applicants should possess the technical qualifications necessary to become Chartered Electrical Engineers and should have experience in the construction and operation of E.H.T., H.T. and L.T. overhead and underground distribution systems, including indoor and outdoor substation equipment.

The appointment is superannuable and subject to medical examination.

Application forms from the Manager, No. 4/5 Sub-Area-MANWEB, Electricity House, Rhostyllen, near Wrexham. Closing date March 31, 1952. (R 337)

GENERATION CONTROLLER required at the Margam Power Station of The Steel Company of Wales Limited. Applicants must have advanced technical education and be experienced in the control of an interconnected H.T. network. Some experience in boiler and turbine operation would be an advantage.

Salary according to age and experience. This post will be permanent and pensionable on satisfactory service. Applications in own handwriting to : The Personnel Superintendent, The Steel Company of Wales Limited, Box No. 3, Port Talbot. (R 272)

GRADUATE ELECTRICAL ENGINEER for electrical laboratory work associated with cable development. Previous experience not essential. Salary according to experience and qualifications.—Applications, in writing, to: The Staff Officer, British Insulated Callender's Cables Ltd., Prescot, Lancs. Excepted persons only. (R 347)

JOURNEYMAN PLUMBER, JOINTERS and MATES are required for factory installation work in the Midlands. London rates of pay.—Write, stating age and giving details of experience to Box No. 1555, Electrical Times. (R 312)

JUNIOR LABORATORY ASSISTANTS required. Qualifications: Higher National Certificate, preferably some experience of instruments. Work will include testing of prototype designs. Enfield district.—Write full details, age, etc., Box 407, Frost-Smith Advg., 64 Finsbury Pavement, E.C.2. (R 286)

KODAK LIMITED invite applications from young ENGINEERS aged 25 to 30 with minimum qualification of B.Sc., plus industrial experience in either the mechanical, electrical or chemical engineering fields. Salaries offered will be commensurate with age, technical qualification and experience. The positions can well be permanent and progressive. The Company operates a non-contributory pension and insurance scheme.—Apply by letter, stating full details, to Men's Personnel Dept., Kodak Ltd., Wealdstone, Middlesex. (R 257)

MAINTENANCE ELECTRICIAN for West Africa for Diesel generator sets, power and lighting installation. Must be able to work on own initiative. Age up to 35 years (approx.). Tour of service 12 to 18 months. Salary £840 per annum, plus production bonus. Initial kit allowance £40. Free furnished quarters. Fully paid home leave one week for every month's service.—Apply by letter, Box No. 1503, Electrical Times. (R 184)

MAY AND BAKER LTD., Dagenham, Essex, require an ASSISTANT FOREMAN ELECTRICIAN. Applicants should have a sound knowledge of alternating current motors, generators, heating appliances and wiring for power and lighting. Candidates, age 28-40, holding a National Certificate in Electrical Engineering are preferred.—Application should be made initially in writing, giving full details of qualifications and previous experience, to the Ministry of Labour, Chequers Lane, Dagenham, quoting reference no. M & B 9033. (R 331)

MECHANICAL DRAUGHTSMAN required for development department. Knowledge of electric lifts an advantage but not essential. Excellent conditions, superannuation scheme, good salary, permanent position, five-day week.—Apply Keighley Lifts Ltd., Dalton Lane, Keighley, Yorks. (R 250)

MIDLANDS ELECTRICITY BOARD require a SECOND ASSISTANT ENGINEER (PLANNING) at the Shropshire and Herefordshire Sub-Area Headquarters. Experience necessary in all branches of distribution work, particularly in the planning of mains extensions and system reinforcements up to 66 kV. Also in the preparation of sub-station layouts, and specifications for metal-clad switchgear. Appropriate technical qualifications desirable. Salary £704 per annum (N.J.B., Class "G," Grade 7), superannuable.—Apply, within 14 days, to Sub-Area Manager, Midlands Electricity Board, Ditherington, Shrewsbury. A. Stephens, Secretary. (R 309)

PROFESSIONAL ENGINEERS IN GOVERNMENT DEPARTMENTS. The Civil Service Commissioners announce an Open Competition to be held during 1951-52 for permanent appointments in many departments of the Civil Service for a wide variety of engineering duties. Applications will be accepted at any time but not later than March 31, 1952, and selected candidates will be interviewed as soon as possible after the receipt of their application forms. Candidates are advised to apply as early as possible.

Age Limits: Candidates must be under 35 on November 30, 1951 with extension for regular service in H.M. Forces and for established Civil Service. For appointments in the Post Office they must be 21 or over, in the Ministry of Supply, 23, and in all other departments 25 or over on that date.

Minimum Qualifications vary for different posts. Generally a university degree in engineering or Corporate Membership of the Institutions of Mechanical Engineers, Electrical Engineers or Civil Engineers, or passes in or exemption from sections A and B of the corresponding Associate Membership examinations, or evidence of exceptionally high professional attainment are required. For certain posts, Corporate Membership of the Institute of Fuel by examination or the Institution of Chemical Engineers, or Graduate Membership of the Institution of Chemical Engineers, or Associate Fellowship of the Royal Aeronautical Society or an Honours degree in physics will be accepted instead.

The salary on appointment will be fixed according to age up to 34. The salary for men aged 25 in London is £628, rising by seven increments to £812, then by four further increments to £970. Salaries for women and for posts outside London are lower. There are prospects of promotion to higher grades on scales for men in London of £970-£1,280, £1,331-£1,536 and above.

Further particulars and application forms from Secretary, Civil Service Commission, Trinidad House, Old Burlington Street, London, W.1, quoting No. S85/51. (R 344)

QUALIFIED ELECTRICAL ENGINEER, aged 27-38 years, possessing a comprehensive knowledge of electrical installation work in all types of buildings, including factories, hospitals, schools, cinemas, etc., and fully conversant with the recognised wiring systems and all relevant regulations governing this type of work. Must possess knowledge of building construction and be capable of reading architects' and engineers' drawings. Able to prepare complete electrical specifications and illumination schemes. Successful applicants will be required to work in Glasgow or Edinburgh. Candidates should be of Scottish birth or extraction. Five-day week. Pension fund.—Reply to Box No. 1137, c/o Whites' Ltd., 72-78, Fleet Street, E.C.4, giving details of age, qualifications, experience and salary required. (R 325)

REQUIRED—ASSISTANT WORKS MANAGER. Manufacturing Company employing 70 people, S.E. London. Must be conversant with Transformer and Electrical assemblies. Good disciplinarian over male and female labour. Excellent prospects for right man.—Write giving previous experience and salary required to Box No. 1531, Electrical Times. (R 273)

JOHNSON & PHILLIPS, LTD.

Vacancies in Transformer Department

1. Estimators and Technical Correspondents capable of preparing tenders for all types of Power Transformers.
2. Designers for all sizes of Power Transformers up to ratings of 30 MVA.
3. Draughtsmen for all sizes of Power Transformers up to ratings of 30 MVA.

In all cases experienced men are desired, but applicants having a suitable technical background would be considered for training.

These appointments offer very good prospects. Five day week. Staff pension and bonus schemes. Sports Club, Canteen, etc.

Applications, giving full particulars of age, training, experience and salary required to Employment and Welfare Manager, Johnson and Phillips Ltd., Charlton, London S.E.7. (R 277p)

REQUIRED by well-known Midlands manufacturing company a DESIGNER ESTIMATOR for transformer section dealing in air- and oil-cooled types up to 500 kVA capacity.—Write, stating age, experience and salary required, Box No. 1561, Electrical Times. (R 328)

REQUIRED FOR MIDDLE EAST. All-round ELECTRICIAN, with experience of overhead lines, conduit and Pyrotenax.—Stage age, experience, references or names to whom we can apply, to Box No. 1563, Electrical Times. (R 329)

SENIOR ELECTRICAL DRAUGHTSMAN for modern London office; preferably with experience of power distribution and lighting installations as applied to chemical and oil refinery plants. Qualifications to H.N.C. standard. Good conditions, 5-day week, pension scheme.—Write full particulars, age, qualifications and experience to Box 5714, c/o Charles Barker and Sons, Ltd., 31 Budge Row, London E.C.4. (R 358)

TECHNICAL ASSISTANT required to collect, classify, distribute and become an authority on patent and design data on light electro-mechanical products manufactured by a large engineering company with laboratories in the West London area. The principal product involved is a domestic electric washing machine having world-wide distribution. Applicants should be aged 25-35, have scientific or engineering qualifications and training, and preferably a knowledge of German or French. Salary: £500-£700, according to age and qualifications.—Write, giving details, to Box No. 1557, Electrical Times. (R 332)

THE ASSOCIATED ETHYL COMPANY LIMITED invite applications for the following appointments to their engineering staff:—

(a) ASSISTANT ELECTRICAL ENGINEER (power system operation).
(b) ASSISTANT ELECTRICAL ENGINEER (plant maintenance).
(c) JUNIOR ASSISTANT ELECTRICAL ENGINEERS.

Applicants should have had a recognised practical and theoretical training in electrical engineering and have achieved Corporate Membership of the Institution of Electrical Engineers.

For appointment (a).

Applicants should be between 30 and 40 years of age and have had professional experience of not less than 10 years in two or more of the following fields:—

(i) Design, operation and maintenance of large industrial h.v. and l.v. distribution systems, preferably in chemical factories.
(ii) Mercury-arc rectifier plant operation and maintenance.
(iii) Supervision of construction programmes.
(iv) Establishment and maintenance of system records.

For appointment (b)

Applicants should be between 30 and 40 years of age and have had practical and professional experience of not less than 10 years in two or more of the following fields:—

(i) Design, installation, operation and maintenance of power and lighting installation in a large chemical plant or oil refinery.
(ii) Operation and maintenance of electrical equipment in hazardous areas, involving the use of flameproof apparatus.
(iii) Medium voltage electrolytic plant maintenance.
(iv) Control of personnel, including staff and tradesmen.
(v) Institution and maintenance of plant records.

For appointment (c).

Applicants should be between 25 and 35 years of age and with similar background to (b), but Graduate Membership of the Institution will be acceptable and the minimum period of experience will be five years.

Initially, appointments will be made to the Company's Manufacturing Department headquarters at Northwich, Cheshire. Eventually, staff may be posted to Ellesmere Port, Cheshire.—Apply, by letter, to Personnel Manager, The Associated Ethyl Co., Ltd., Northwich, Cheshire. (R 294)

THE GENERAL ELECTRIC COMPANY, Witton, require for their switchgear department, DRAUGHTSMEN, preferably with experience in any of the following: design of circuit breakers and metalclad switchgear, industrial control gear, switch and control board layout, diagrams of connections, traction control gear. Applications from good mechanical draughtsmen are also invited. Good remuneration for experienced men.—Apply to your nearest Employment Exchange. (R 313)

TRANSFORMER TEST ENGINEER. Young man required for a section of the test room dealing with a variety of unusual transformers. Preference will be given to applicants qualified by holding the H.N.C. in electrical engineering, completion of an apprenticeship with an electrical manufacturer, and having test experience on any types of transformers. Desirable additional experience would be: testing precision instrument transformers, extra h.v. small transformers, transformers used by H.M. Services, and electrical instrument calibration. The salary would be determined by proof of experience and capabilities. Own staff have been informed.—Box No. 1547, Electrical Times. (R 300)

THE ENGLISH ELECTRIC CO., LTD., invites applications from young ENGINEERS wishing to make careers on commercial side of manufacturing industry. Vacancies available at several of the company's factories in departments handling tenders and contracts for plant and apparatus for power stations, sub-stations, industrial and other electrification. Requirements: good general education, engineering degree or equivalent (electrical or mechanical) and recognised manufacturing apprenticeship. Some commercial experience an advantage. Age, whether married or single, and position regarding military service to be stated. Short course of preliminary training with full pay will be given where necessary, commencing early April. Positions permanent. Excellent opportunities for advancement. As these vacancies are for professional engineers, applications, giving full details and quoting ref. 348 may be addressed direct to Central Personnel Services, English Electric Co., Ltd., 24-30 Gillingham Street, London, S.W.1. (R 263)

TRANSFORMER TESTER required to take charge of Test-bed dealing with units up to 10 MVA. Candidate should be capable of carrying out complete tests to the satisfaction of Inspecting Engineers.
Also ONE JUNIOR TESTER.
State experience and salary required to Technical Director, Bryce Electric Construction Co. Ltd., Kelvin Works, Hackbridge, Surrey. (R 275)

YOUNG ELECTRICAL ENGINEER required with qualifications between H.N.C. and degree standards, for routine inspections and maintenance of electrical plant and wiring at the various printing works and offices of a large group of newspapers. Must have had at least three years' practical experience in this class of work.—Reply, giving fullest particulars of age, education, qualifications and experience, and stating salary required, to Box No. 1525, Electrical Times. (R 238)

APPOINTMENTS WANTED

ELECTRICIAN, 27. Thorough knowledge of installation theory and practice, seeks position anywhere, of trust with good prospects of advancement.—Box No. 1549, Electrical Times. (R 302)

EXPERIENCED ELECTR/MECH.: ENGR.: SALES REPR. Seeks agency for pumps and motors in southern counties.—Box No. 1573, Electrical Times. (R 359)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed. Edgware 8631 (4 lines).—Service Electric Co., Ltd., Stanmore, Middx. (D 324)

CASTINGS. Fisher Foundries Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (P 570)

ELECTRICAL COIL WINDING.—Transformer, choke spool, and former coils. Most gauges of copper available. For early delivery. Quantity production. Light assembly capacity: keen quotations.—General Ignition Manufacturing Co., 5 Ludgate Hill, Manchester 4. Tel. DEA 3264. (R 227)

NON-FERROUS Casting Capacity available.—Sandyford Foundries Ltd., Boston Works, Sandyford, Stoke-on-Trent. (P 801)

WANTED

A.C./D.C. MOTORS, STARTERS, complete change over installations, etc.—A.A. Electrical Co., Ltd. 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (A 20)

£50,000

Immediate cash available for purchase of New Ball and Roller Bearings, all types, Steel Balls and Rollers. Top prices Paid, small quantities accepted.

CLAUDE RYE LTD.,
895-921 Fulham Road, London, S.W.6
RENown 6174 (P 548p)

AMMETERS 2½-in. moving iron 0-15 and 0-25 amps. Nalder, Ferranti, Sangamo, etc. Also Santon Rotary Switches X.123/9 10 amp and X.323/9 30 amp.—Offers to Box No. 1557, Electrical Times. (R 320)

BACK COPIES ENGINEERING JOURNALS wanted, cheap.—Gotheridge, 10-11 Grosvenor Place, S.W.1. Sloane 0486. (R 362)

BALL, Roller and Taper Roller Bearings purchased. Good prices paid.—Offers to Berend and Berend Ltd., 62 Berners Street, London W.1. (R 333)

SCRAP ACCUMULATOR PLATES and Sediment wanted, any quantities. Also Storage Batteries purchased and dismantled.—Phone or write, Elton Levy Co. Ltd., St. Ermin's (West Side), Caxton Street, London S.W.1. Tel.: WHitehall 9621/2/3. (A 3)

SURPLUS STOCKS of any type urgently required. In particular BOXES of any type bought and sold.—H. Pordes, 138 New Cavendish Street, London, W.1. (MUSeun. 5250.) (R 348)

WANTED, ROTARY CONVERTORS, any size.—Universal, 221 City Road, London, E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED. Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (A 13)

AGENCIES

MANUFACTURERS' AGENTS ASSOCIATION, INC. (E.T.), 8 Bream's Buildings, London W.C.2, supplies free lists of Agents to Manufacturers seeking representation in important industrial centres. Membership available to established agents only. Particulars supplied. (A 7)

SPANISH MANUFACTURER of CRYSTAL, BRONZE and PORCELAIN CHANDELIERS, BRACKETS, and similar lighting appliances, requires AGENTS in London, Midlands and Scottish areas.—Apply: Enrique Romagosa, Travesera 83, Barcelona, Spain. (R 314)

FOR SALE

AUCTION

By Order of the Ministry of Supply.

E R

No. 1 E.S. Sub-Depot (R.E.), South Littleton,
Near EVESHAM, Worcestershire.
Important Sale by Auction
of
GOVERNMENT SURPLUS PLANT AND STORES.
Including: 75 Generators, Winget, Johnson, Mather Platt and Pulsometer Water Pumps with petrol engines, 50 Reception Sets, Metropolitan-Vickers Generator with Perkins Diesel engine, Lister Diesel engine with pump.

ELECTRICAL EQUIPMENT

including: Switchfuses, Cable barrows, Battery chargers, Fuse wire, Electric light bulbs and shades, Condensers.

HEAVY ARMOURED HOSE

Motor Transport equipment, Plant and Machinery, Overhead Crane components, Drag Ropes, Rubber Air Hose, Lee Howl hand pumps, Dry Batteries, Collapsible Boats, 2 Pontoon Tugs with petrol engines.

To be sold by auction by

E. G. RIGHTON & SONS
at South Littleton Depot,
on
THURSDAY, MARCH 27, 1952,
commencing at 11 a.m.

View days: Monday, Tuesday and Wednesday March 24, 25 and 26, from 10 a.m. till 4 p.m. and morning of sale from 9 a.m. till 11 a.m.
Admission by Catalogue only. Price 6d. (Postal Orders only), to admit two persons to view and one on Sale day, may be obtained from the Auctioneers' Offices, Evesham, Worcs. (Tel. 6155). (R 319)

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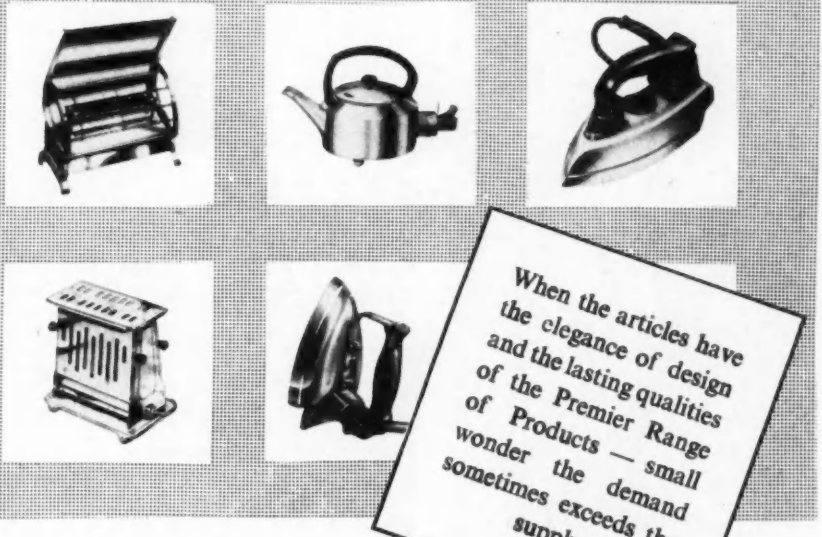

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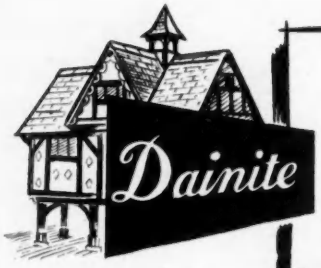

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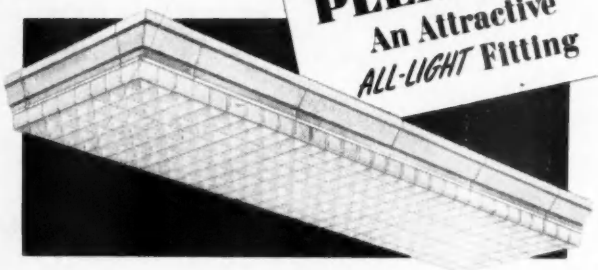

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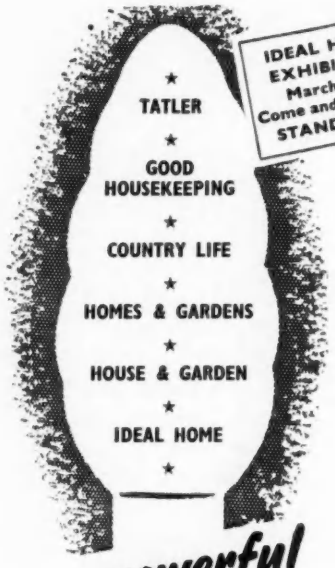
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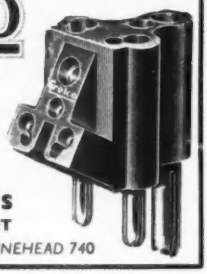

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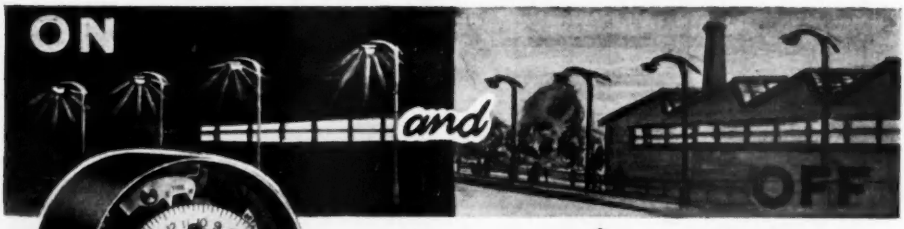

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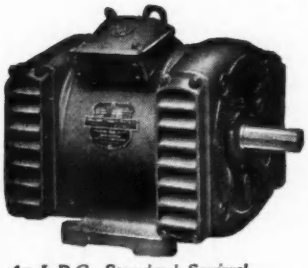

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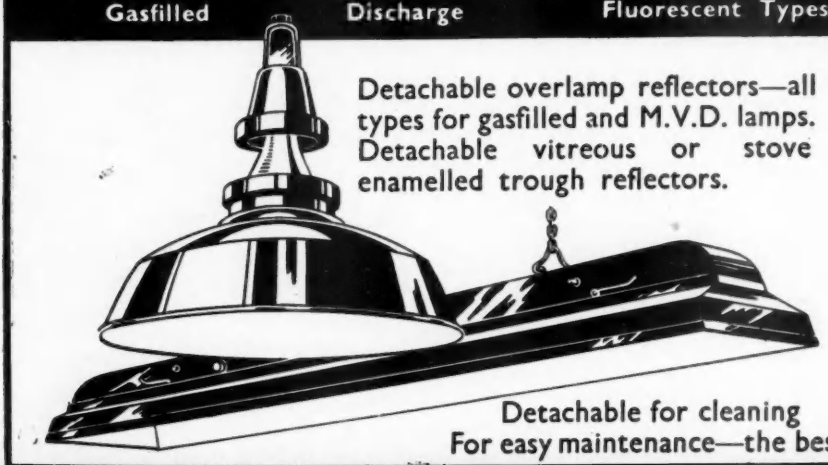

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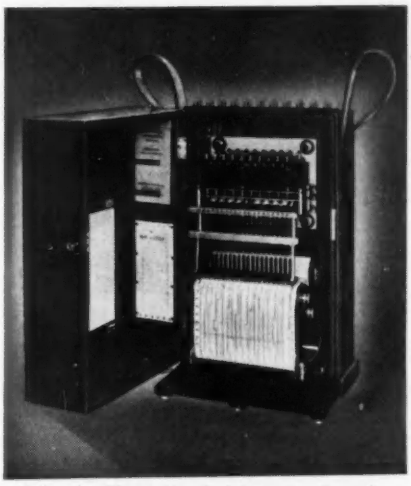
Evershed Operation Recorders aid good management

Automatic Time and Quantity Records for Efficient Planning and Operation



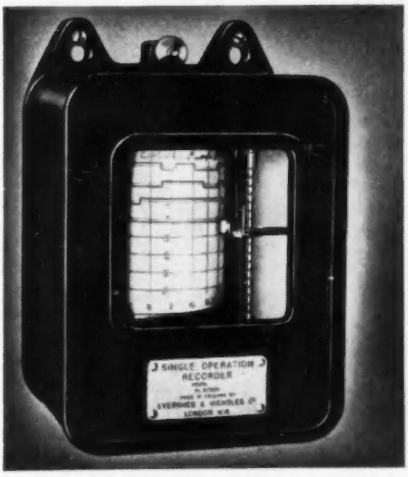
A Portable 20-pen Evershed Operation Recorder used by the Post Office for recording the volume of telephone traffic on lines.

The first essential to sound management is to know the facts—the relevant facts at the right moment. Evershed Operation Recorders provide automatically, in permanent, easily accessible form, these facts about the frequency and duration of any operation it is desired to study. They are widely used for keeping records of the stopping and starting of machines, or the opening and closing of switches. When required, operation details can be combined with a quantity record. Chart speeds can be adjusted to individual needs.

Evershed Operation Recorders may have up to 20 pens recording on a single chart, thus enabling management to compare immediately the details of several pieces of apparatus.

Evershed Operation Recorders are strongly made; their accuracy and reliability the outcome of Evershed's fifty years' experience of developing equipment for centralised information and control.

Full details are contained in a new Evershed Leaflet. Ask for Publication J.248.



A simple Single-pen Evershed Operation Recorder for maintaining on a chart the complete history of a single operation. Very useful as a check on the operation of automatic plant and hand controlled apparatus that is in and out of use at intervals.

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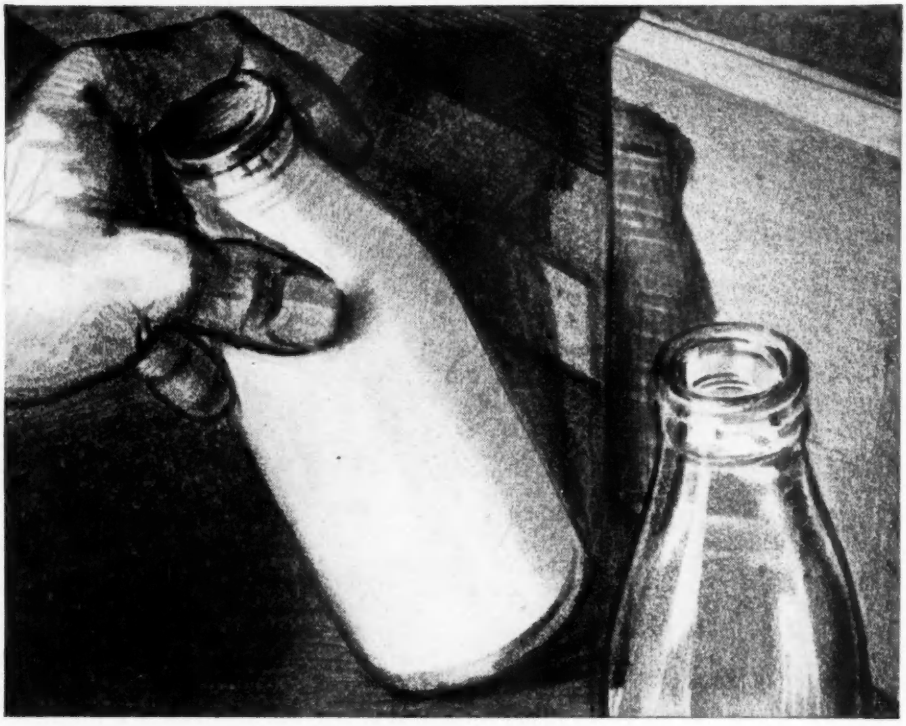

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Look at that pint of milk on your doorstep. What is its butter fat content? Is its calcium content as high as it should be? To what temperatures has it been raised and lowered to kill any lurking bacilli? You don't know. But you take it for granted that your milk is as good as today's scientific food safeguards can make it.

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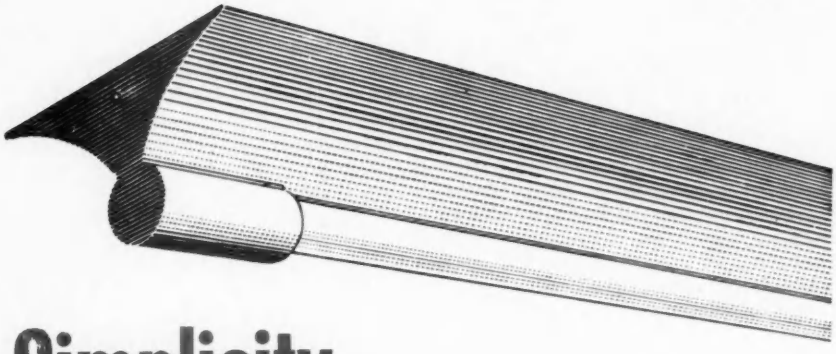

Simplicity is the keynote

of this popular Mazda fitting

The graceful " Seagull " contours of this fitting form a natural line between the fluorescent lamp and the ceiling. At the same time, the white reflecting surfaces give an even distribution of light over a wide area. Essentially the Mazda F.1030/1/8060 is a neat, unobtrusive fitting designed for speedy installation and simplified maintenance.

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Mazda F.1030/1/8060

For use with a single Mazda 80 watt Fluorescent Lamp.

All the lamp auxiliary gear is mounted on a detachable backplate and ready wired to a connector block. This backplate is first mounted flush to the ceiling after which the main body of the fitting is simply attached by two knurled nuts.

Sliding end-covers support the lamp and conceal lamp-end flicker.

Construction is of stout gauge sheet steel finished in durable white stoved enamel.

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